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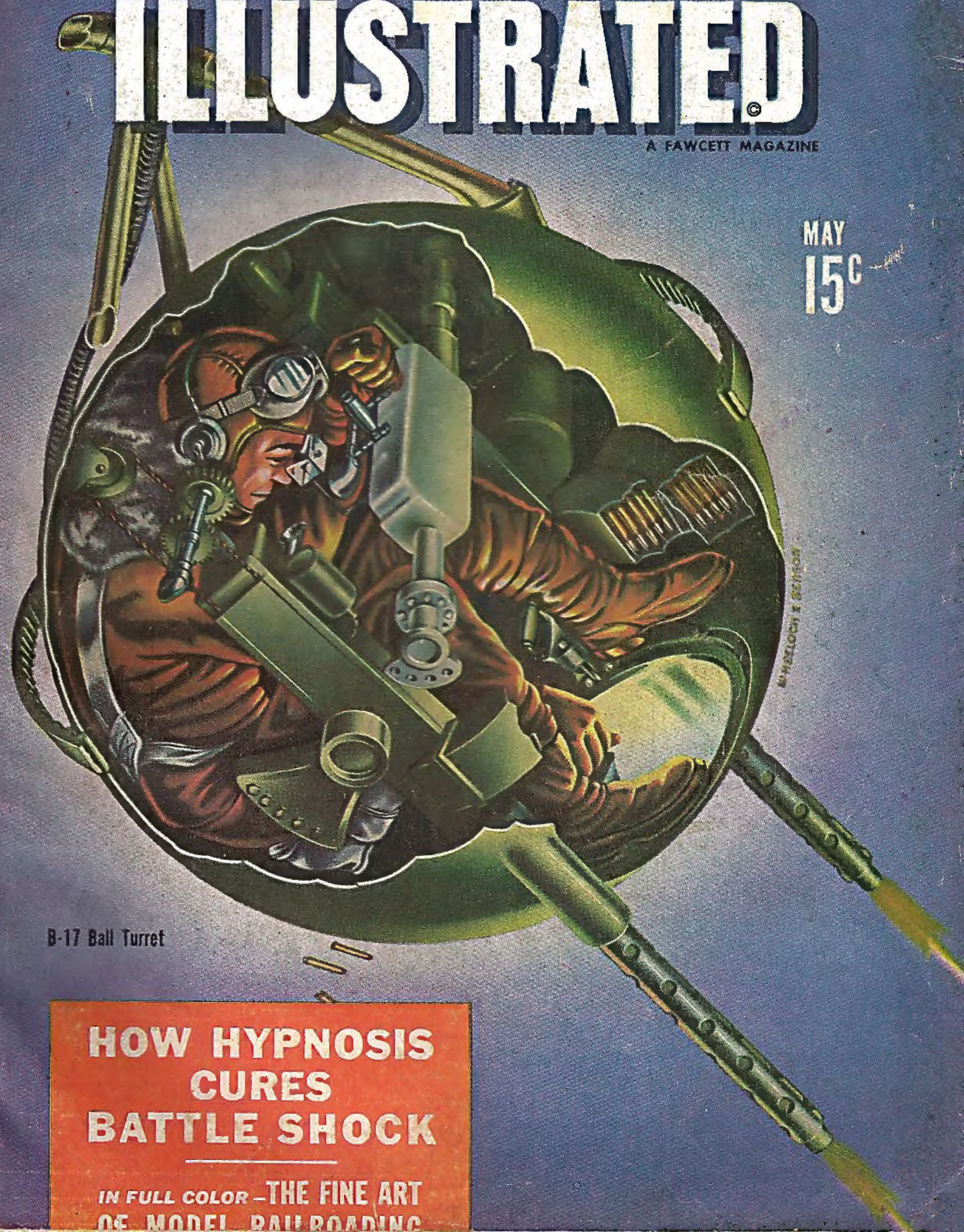
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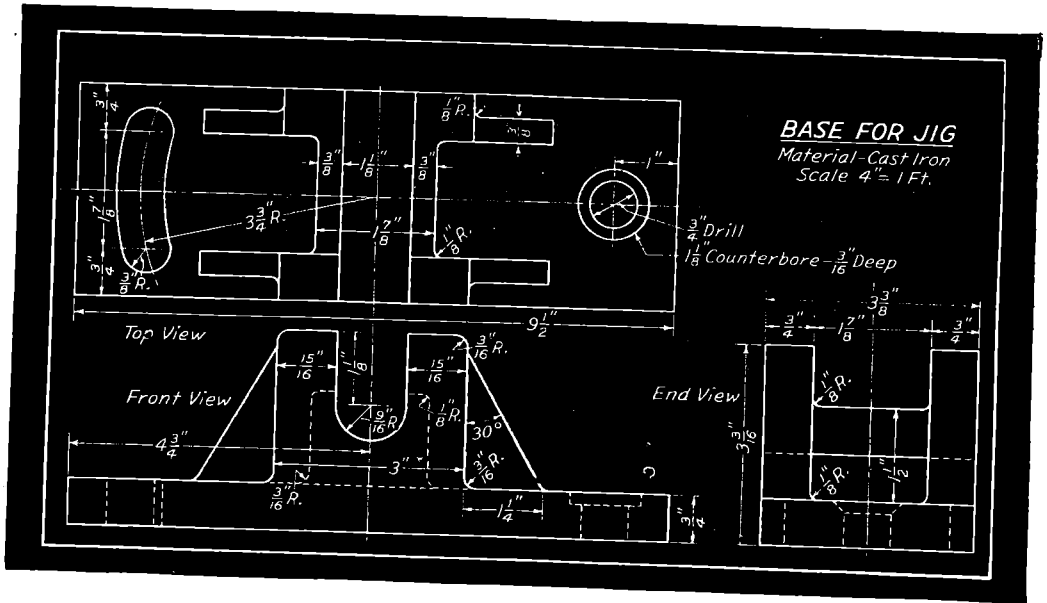
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MAY, 1945

VOL. XXXIV NO. 1

On the cover: Cutaway drawing of Flying Fortress ball turret by Wheelock & Benson

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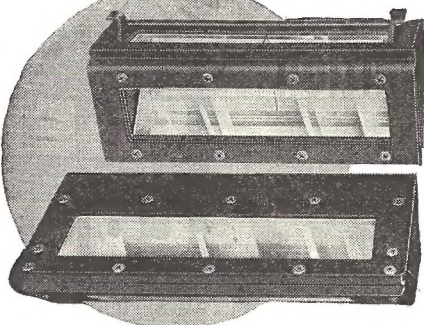
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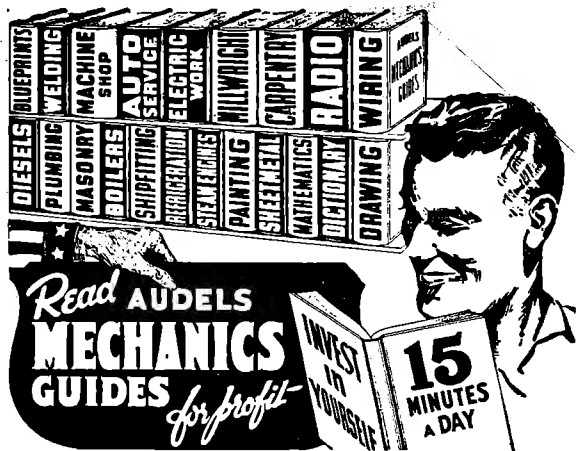
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Indicating Caliper

Dr. E. L. Mc Keen, Los Angeles, Cal., submits a sketch of an indicating caliper and wants us to express an opinion of its value.

ANSWER: In accordance with our policy we are withholding all details of this invention and all direct references to the manner in which this instrument is to function.

To our mind your indicating caliper is the best improvement we have seen in such instruments for some time. By all means have a search made immediately. Any reliable patent attorney can do this for you. If the search indicates that there is a good chance for getting patent protection, go right ahead and file.

Meanwhile, have someone make a number of models of this new tool. Perhaps it would be safer to have the parts made in two shops and assemble the units yourself. Then, as soon as the patent is filed and if your attorney considers it safe, submit the finished tool to a reputable manufacturer. This instrument should be in the hands of machinists today. It probably will meet with instant favor. And don't forget to send us one when you "put it over."

Model Airplane Motor

Merton E. Davis, Springfield, Mass., outlines what he considers to be the reasons for difficult starting of model airplane motors and suggests a method to overcome the difficulty.

ANSWER: Again, we are withholding the details of this suggested improvement.

We are not at all sure that the findings disclosed by you are the only reasons for difficult starting of model airplane engines. We have seen some engines which were extremely difficult to get going and others of the same model and manufacture which go off with the slightest turn.

However, you have the answer to your question right in your own lap. You state that you have three engines which are difficult to start. The change you recommend could be made easily on any of those engines. Why not do so, or have a local machinist do the job for you. In fact, you

could use a small piece of metal, put it in place and knock it off when the engine got started.

Try it and let us know how much you improved the performance.

Toilet Tissue Holder

Guthrie B. Stone, S2/c, Corpus Christi, Texas, has designed a toilet tissue holder with which it becomes possible to replace rolls of tissue more quickly than on present-day styles. He wants to know what we think of it.

ANSWER: We are quite sure that you cannot get broad and basic coverage on your design for a toilet paper holder. However, we recommend that you have a search made to determine the prior art in this field.

Before proceeding further with this idea we would recommend that you examine the item carefully. What does it do which is not done by other holders? True, it gives one an opportunity of replacing the roll of paper more quickly. But the item projects from the wall. Even when made of much heavier materials than present style holders, it is subject to breakage much more so than the cheapest holder.

The roll is likely to slide off or be removed with such ease that the paper would be used for many purposes for which it was not intended.

Regardless of the outcome of the search we recommend you exercise caution in any further action. Future marketing prospects do not seem good.

Auto Wheel Driven Buzz Saw

R. H. Wakeman, Pollack Pines, Cal., wants to know if we would recommend patenting a buzz saw arrangement in which the saw is driven from the rear wheel of a jacked up auto.

ANSWER: Nothing new appears in the proposal to operate a buzz saw by driving it from the rear wheel of a car other than the addition of a second pulley which is not at all necessary.

We would advise against further action. However, if you want the records searched, have this done.

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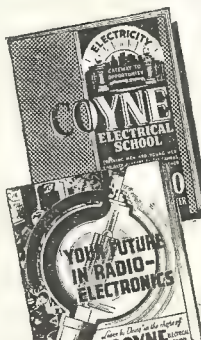
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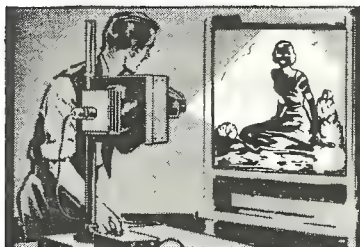
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Chips from the **EDITOR'S WORKBENCH**

WINNER OF FAWCETT AVIATION AWARD



WINNER of the 1945 Fawcett Aviation Award was Edward C. Wells, Chief Engineer of Boeing Aircraft and designer of the B-29 and its postwar transport counterpart, the C-97. The latter ship is the one which recently broke the transcontinental non-stop speed record by flying from Seattle to Washington, D. C. in slightly more than 6 hours.

Mr. Wells (right) is being congratulated by Secretary of Treasury Henry A. Morgenthau, while looking on is Milo Boulton of the CBS "We The People" program. Presentation was made in Philadelphia on February 18th by Major General K. B. Wolfe, first commander of the 20th (B-29) Airforce in China. The award, with \$1,000, is presented annually by Fawcett Publications to the person, persons or organization making the greatest scientific contribution to the advancement of aviation as a public service.

COMING NEXT MONTH

Organize a Flying Club!

Roland Cueva's two-part article on "Planes Are Getting Personal" gives you the lowdown on the new simplified-control planes that will be yours for the asking after the war. But a lot of people won't be able to

afford their own private planes, will have to pool their resources in flying clubs. Ed Yulke's story explains just how to organize a flying club on a business-like basis. A must for civilian flying enthusiasts with limited budgets.

The Man Who Sees Things

Assen Jordanoff not only sees things—he makes others see them, too. In fact, he's the most spectacular trail-blazer in the field of visual aids, having dissected the B-17, the B-29, the C-54, and numerous other weapons of war so that would-be pilots and maintenance crews can grasp how their insides operate at a glance. This special eleven-page feature by Don Romero, illustrated in full color with some of Jordanoff's most striking drawings for the Air Forces, highlights the coming issue.

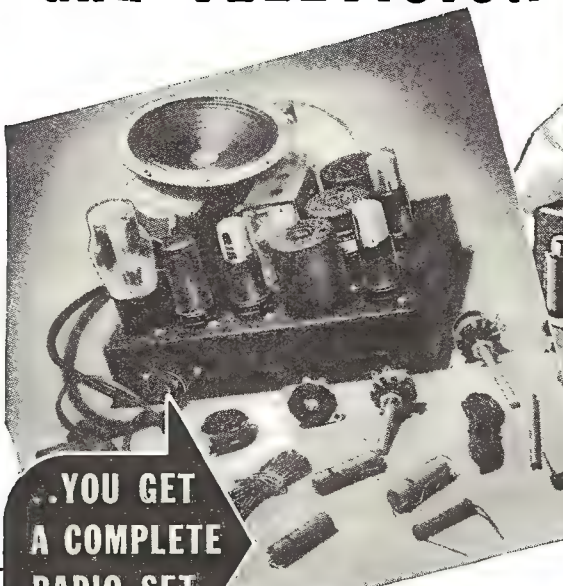
9-CYLINDER BABY



This little 9-cylinder engine weighing 11¼ pounds, and developing 2.3 h.p., is the work of Clifford M. Jones, of Portland, Oregon. A small lathe and ordinary hand tools are all that are needed to build it, according to Mr. Jones. It's a 4-cycle job, and develops the horsepower mentioned at 4,200 r.p.m. It will turn more than 5,000, its builder states. A \$3.00 Workbench award and a Certificate of Merit go to Mr. Jones.

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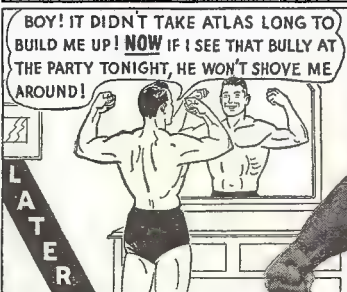
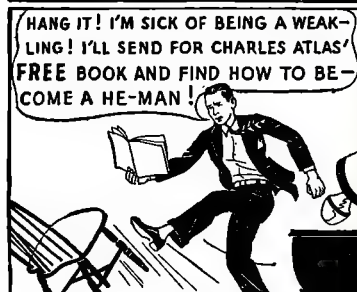
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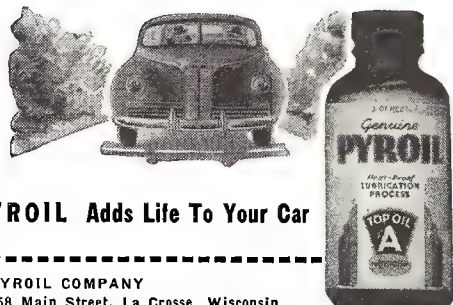
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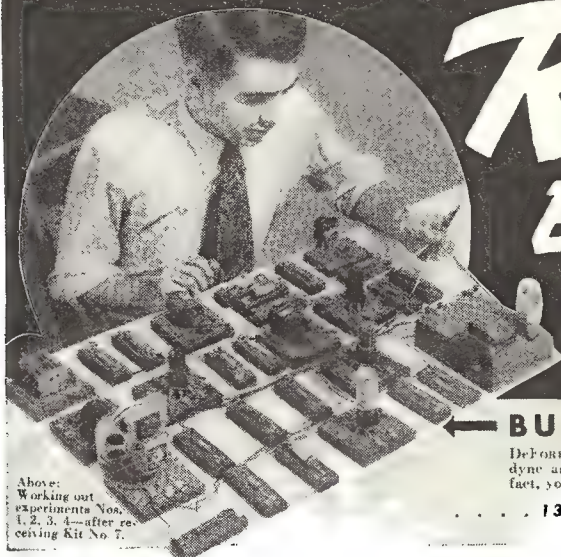
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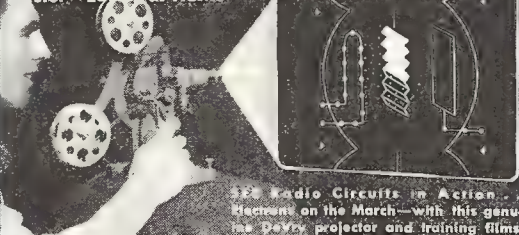
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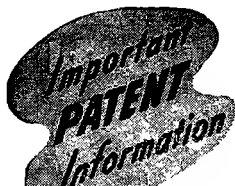
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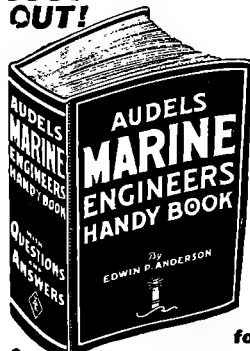
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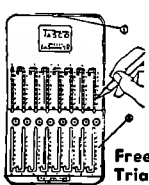
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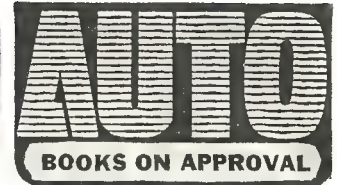
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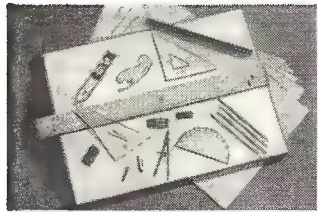
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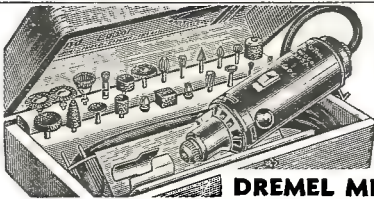
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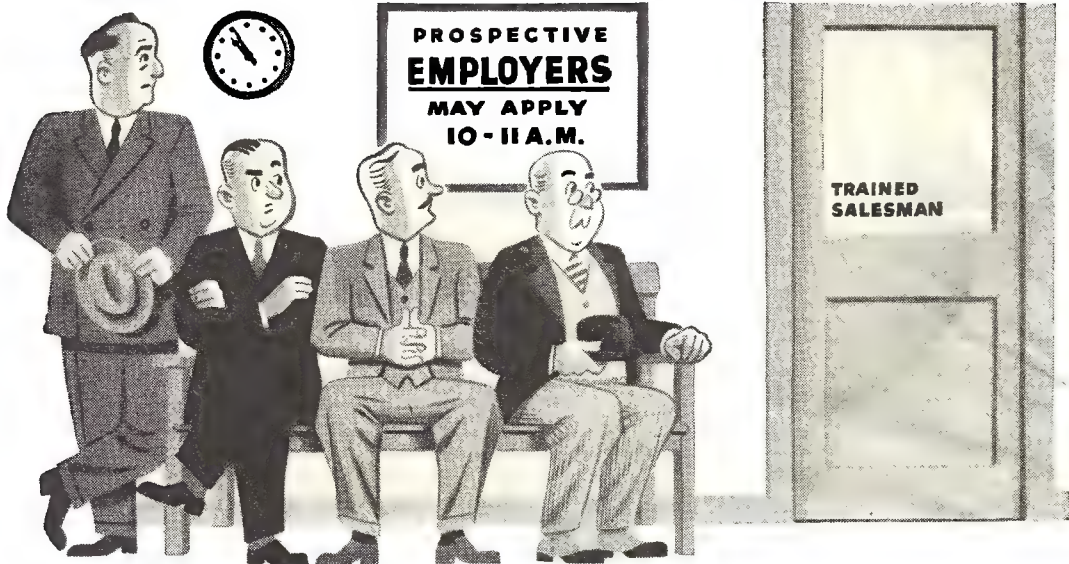
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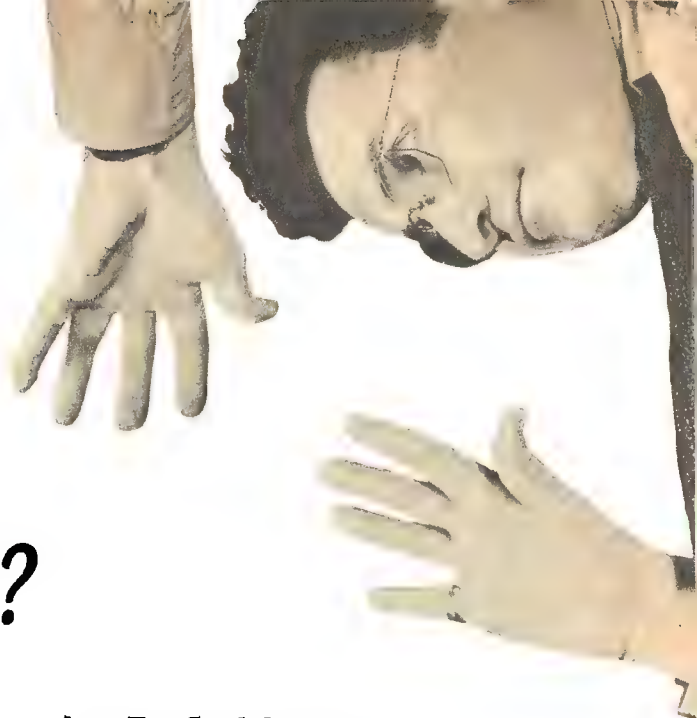
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Army medicos. It cures almost everything from anxiety to asthma.**

THREE months after he had made a split-second escape from the fast-flooding engine room of his torpedoed ship, a 21-year-old merchant seaman reported as a patient to the U. S. Marine Hospital at Ellis Island, New York. He complained of severe and constant headaches, sleeplessness, and told of two distinct occasions when he had "blacked out."

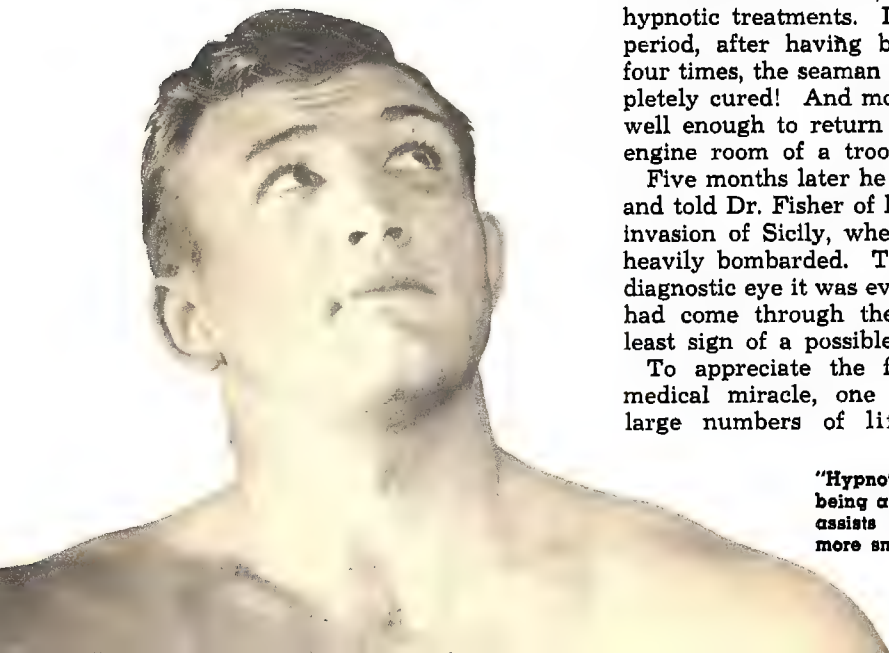
Like many other soldiers and sailors who have undergone the hardship and terror of battle, this seaman was suffering from what the public has learned to call "combat fatigue" or "psychoneurosis" and medical science more accurately terms the "acute traumatic war neuroses."

Obtaining the seaman's consent, Dr. Charles Fisher, psychiatrist for the U. S. Public Health Service, gave him a course of hypnotic treatments. In an amazingly brief period, after having been hypnotized only four times, the seaman left the hospital completely cured! And more important, he was well enough to return to his old job in the engine room of a troop-carrying transport.

Five months later he revisited the hospital and told Dr. Fisher of his experiences in the invasion of Sicily, where his ship had been heavily bombarded. To Dr. Fisher's skilled diagnostic eye it was evident that the seaman had come through the ordeal without the least sign of a possible relapse.

To appreciate the full meaning of this medical miracle, one must remember the large numbers of life-long inmates of

**"Hypnotic suggestion," which is
being administered here, potently
assists the patient to function
more smoothly in his daily work.**





Demonstrations of "mass hypnosis" are often given G.I.'s to show them hypnosis is harmless. These three hypnotized soldiers drank water, were told it was whisky—and promptly got drunk.

Veterans' Hospitals throughout the country, ghostly, fear-frozen survivors of the First World War who can never hope to be rescued from their benumbed psychic paralysis. And remember also that it is hypnotism, or hypno-analysis, in Dr. Fisher's scientific lingo—long regarded by both the general public and the medical profession with a confused mixture of superstitious awe and downright disbelief—that opens a brighter future for the psychoneurotic casualties of today's battlefields.

Dr. Fisher's masterly use of hypnosis is only one of an ever-growing list of successful cases in the records of war-time psychiatry. In U. S. Army, Navy and Merchant Marine Hospitals, behind every battle front and at the terminus of every supply line, hard-pressed doctors in search of short-cut but efficient methods of mental therapy are turning to one form or another of hypnosis.

A psychiatrist has often been likened to a detective of the soul's dark depths, a Sherlock Holmes on the track of psychic clues. Once he has the all-revealing key in his possession,

he can with little difficulty unlock those hidden and elusive chambers in the mind where mental trouble breeds. As Sigmund Freud, Viennese doctor who trail-blazed the path for modern psychiatry with his theories of dynamic psychology, pointed out long ago, mental patients are chiefly suffering from bad memories which they have pushed deep down within their minds in a seemingly successful effort to forget them. Freud laid it down as the cardinal tenet of psychoanalytical law that before a cure could possibly succeed the patient himself, under the expert guidance of the psychoanalyst, must dredge up these painful, repressed memories out of the murky and tangled depths of his "unconscious."

Though Freud's illuminating interpretation of the dynamics of the neurotic mind is quite generally accepted by psychiatrists today, his methods of cure, which involve a long and expensive treatment, are particularly impractical during war-time. For time-pressed, hard-working psychiatrists like Dr. Fisher, confronted with battle casualties in need of immediate and effective attention, the job is

the tricky one of retaining Freud's search-light-like analytical ideas while devising new and speedier techniques. And hypnoanalysis, combining Freudian insight with the sharp uncovering probe into the recesses of mind that hypnotism provides, does the job.

Hypnosis can be induced by a number of well-tested procedures. However, the procedure used by Dr. Fisher so neatly epitomizes the whole process of suggestion, so important to the induction stage, that it is worth describing in some detail. In the early days of hypnotism it was customary for the hypnotist to assume a rather dictatorial pose towards his subject, brow-beating him into the hypnotic trance. But with the development of a rational psychiatry the hypnotic subject is fully informed and understands each step as it is taken.

When the seaman had his first interview with Dr. Fisher, he was arrogantly convinced that no one could ever hypnotize him. Like a lot of misinformed people he thought that hypnotism was in some way a "battle of wills" between the person being hypnotized and the hypnotist. Before another step in the treatment could be taken, Dr. Fisher had to dispel this prejudice. For unless the subject is willing and actively cooperates with the hypnotist not even Svengali can turn the trick.

Dr. Fisher then told the seaman to stand in the center of the room, holding his arms rigidly in front of him, his fists tightly clenched. "Make your arms just as straight and rigid as you possibly can," Dr. Fisher commanded. "*Just as rigid as you possibly can!*" After thirty seconds Dr. Fisher said, "Now look at me. I'm going to hold your arms and I don't believe you can bend them. Try it. You can't do it. *You can't do it. YOU CAN'T DO IT!*"

The seaman tried to move his arms and found that they would not bend. He strained and strained, his face becoming contorted with the muscular effort, but his arms remained rigid. Suddenly

Dr. Fisher said in a sharp voice, "Now you can bend them. When I snap my fingers!" With the sound of Dr. Fisher's snapping fingers the tension in the seaman's arms disappeared and he bent them easily. Impressed by the suggestive power latent in hypnosis, from that time on the seaman made an excellent subject. [Continued on page 60]



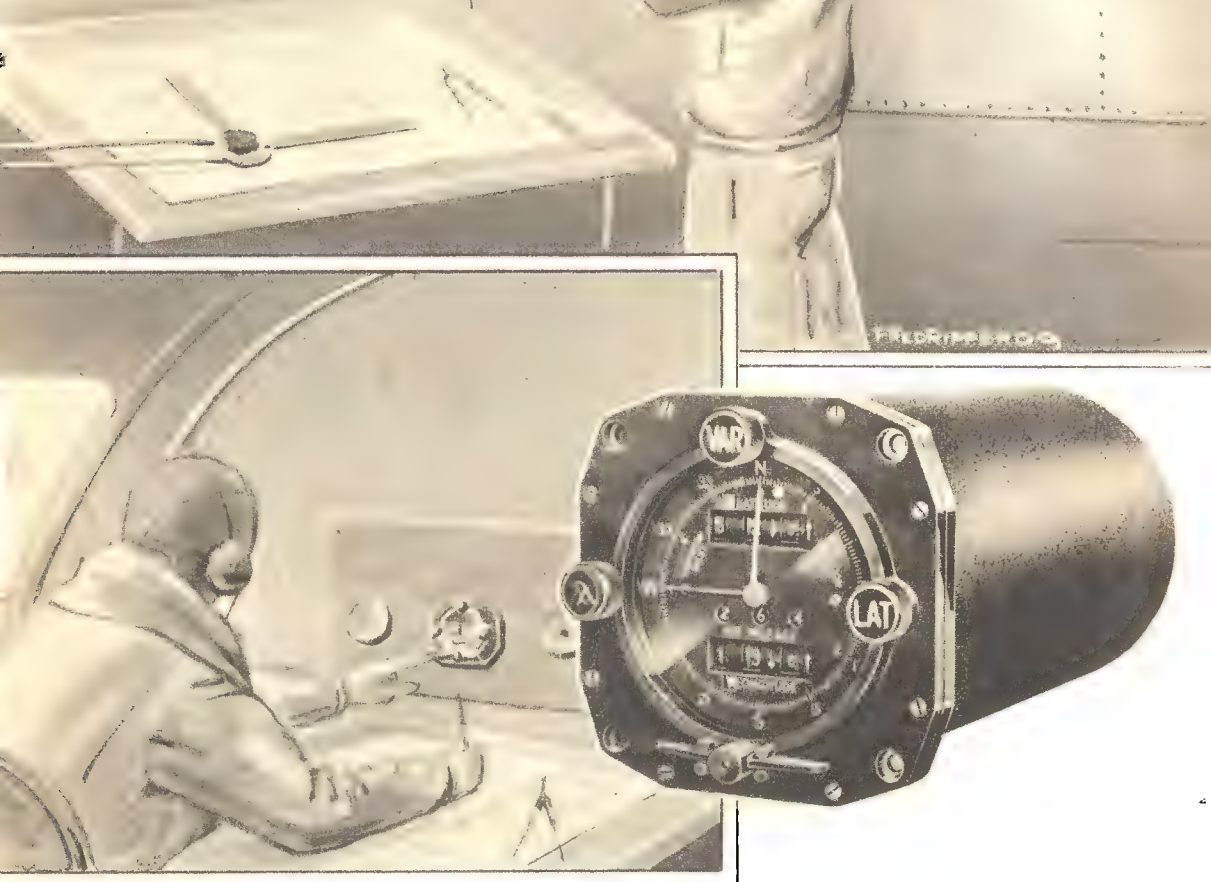
Hypnotists at AAF base in Ireland demonstrating to soldier audience how an Army officer staggers and lurches when hypnotized and told that he is drunk.



While in the hypnotic trance, a soldier will often relive the terrors of battle, showing violent signs of fear, anguish.

ROBOT PATHFINDER

Replacing sextant and compass,
aviation's API solves tough
navigation problems quickly.



ONE of the great technical achievements of the war has just been revealed by the armed services. It is an almost magical device called the "Air Position Indicator" which gives the pilot and navigator of a bomber continuous, automatic position readings in terms of longitude and latitude.

Though the device has been in use for many months, it has been kept a secret until now

because of its importance to the great Super-fortress bombing attacks on Japan.

The API is invaluable not only because it tells pilots exactly where they are on the earth's surface in a split-second's time, but also because it saves hours of difficult and taxing work for the navigator of a bomber, who has hitherto had to compute his plane's position laboriously [Continued on page 141]



HE PUTS UP A BATTLE

The turret gunner can practice shooting at attacking fighters with the Dual Projector Trainer.

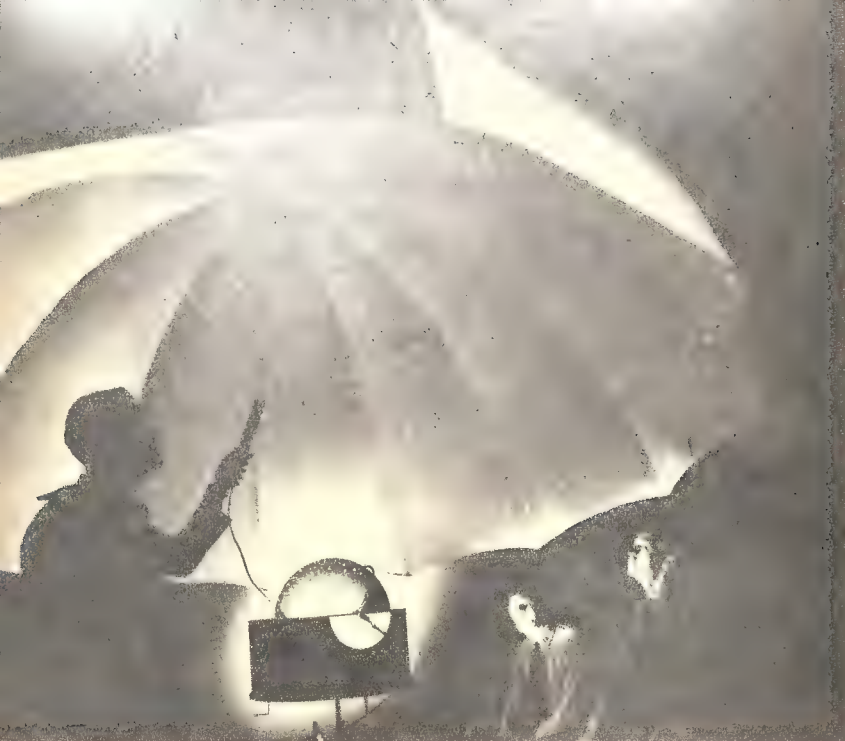
by Don Romero

After learning combat tactics in Captain de Florez's training devices, Navy pilots say shooting down Japs is anticlimax.

AT 56, short, dynamic, mustachioed Captain Luis de Florez, USNR, has done more to blast the Japanese air force out of the sky than have the Navy's 20 highest scoring aces. By means of aerial-training devices that have been popping out of his inventive mind for the past four years and that have been acclaimed "the greatest military training aids of modern times," the Captain has sent Jap planes plummeting to destruction, has saved Navy flyers from death and injury, and has probably done as much to speed the winning of the war in the Pacific as any other man in the



Irrepressible, untiring Captain Luis de Florez was awarded the Collier trophy for his training devices.



Star gazing as a means of learning navigation is made possible by the Star Recognition Trainer.



Fighter pilots like the one in this Gunairstructor don't need lots of combat to get experience chasing enemy bombers.

Allied armed forces.

Recently awarded the famed Collier Trophy by the National Aeronautic Association, de Florez has accomplished this incredible feat by the development of "synthetic" training devices that duplicate actual aerial warfare with almost terrifying realism, that teach our flyers every trick in the grim business of shooting enemy ships to pieces, and that cut the training of pilots, bombardiers, flight engineers, and gunners to only a fraction of the time and cost formerly required.

Four years ago when he was netting a tidy \$100,000 a year as a consultant engineer to several of the country's leading oil companies, de Florez was called to

the Navy's Bureau of Aeronautics, given the rank of Commander, and set to pondering ways and means of shortening and improving the training of Navy's flyers. De Florez, who probably holds the world's speed record for a man making up his mind, promptly announced that the only answer was "synthetics." Even before the Navy's conservative brass hats could recover from this seemingly astounding proposal, he let go his second salvo. He announced that by means of his "synthetic" training devices, the Navy would be able, possibly in a matter of weeks, to convert aviation students into flyers who would be almost as seasoned and battle-tested as those who had been flying in actual combat for a year.

Shaking their heads and looking more dubious than ever, the Navy awarded him a meager \$50,000 appropriation, and asked him to show what he could do. De Florez showed them in short order. Recruiting a few assistants, he went promptly to work inventing and building his synthetics.

A few months later when the Navy authorities got around to inspecting his first devices, they shook their heads again, this time in amazement, upped his appropriation to a million and a half, and told him to get more assistants. A few months later they came around, took another look, and went through the same routine all over again. Today, as head of the Navy's Special Devices Division, de Florez is operating under an appropriation of 10 million dollars, has a staff of over 400 men that includes some of the best technical brains in the country, and at the latest count had a list of completed training devices that was reaching up into the hundreds.

In attacking the tremendously intricate job of training Navy flyers, de Florez hasn't ducked a single important problem. To some observers, in fact, he appears to have gone out of his way to create problems so that he could solve them with one of his synthetic devices. Perhaps the most famous of his innumerable machines are his "PBM" instrument panel for training flight engineers; his "gunairstructor" which teaches pilots how to dogfight enemy planes; his "3A2" which shows a rear-turret gunner how to pour it into a Jap who tries to sneak up on his ship's tail; his deflection computer which shows pilots and gunners just how much they have to "lead" an enemy ship if they want to hit it where it hurts the most; and his elaborate replica of a B-24 bombardier's compartment, in which a student, using a Norden bombsight and peering down on a movie screen on which the ground appears to be moving under him, practices the delicate art of dropping 1,000-pound bombs on enemy installations 30,000 feet below. [Continued on page 58]

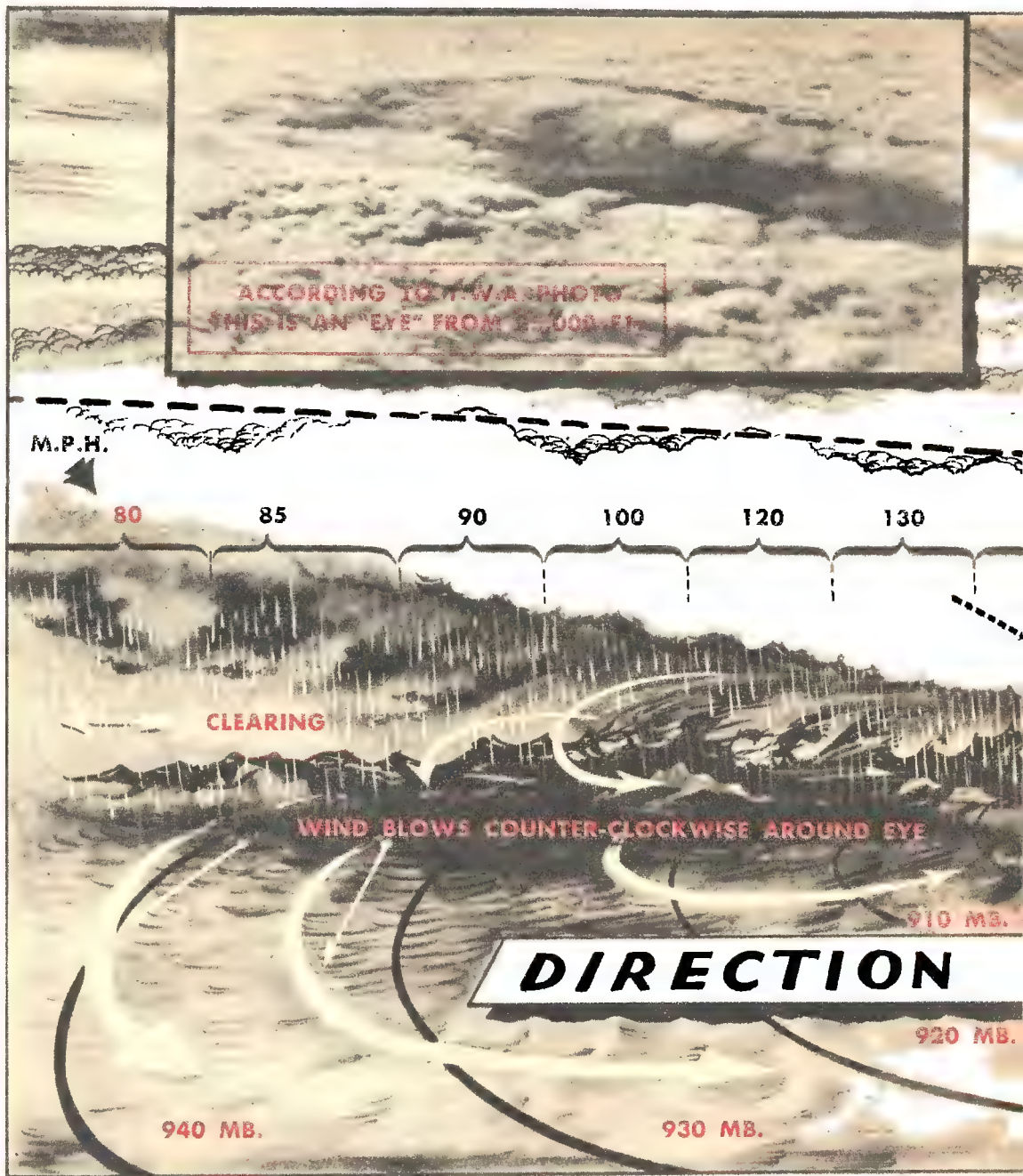
May, 1945



Instructor's station in the Bombing and Dead Reckoning Trainer developed by Bureau of Aeronautics.



Practice in estimating lead is given on Fixed Gunnery Deflection Trainer. Counter registers shots fired, hits scored.



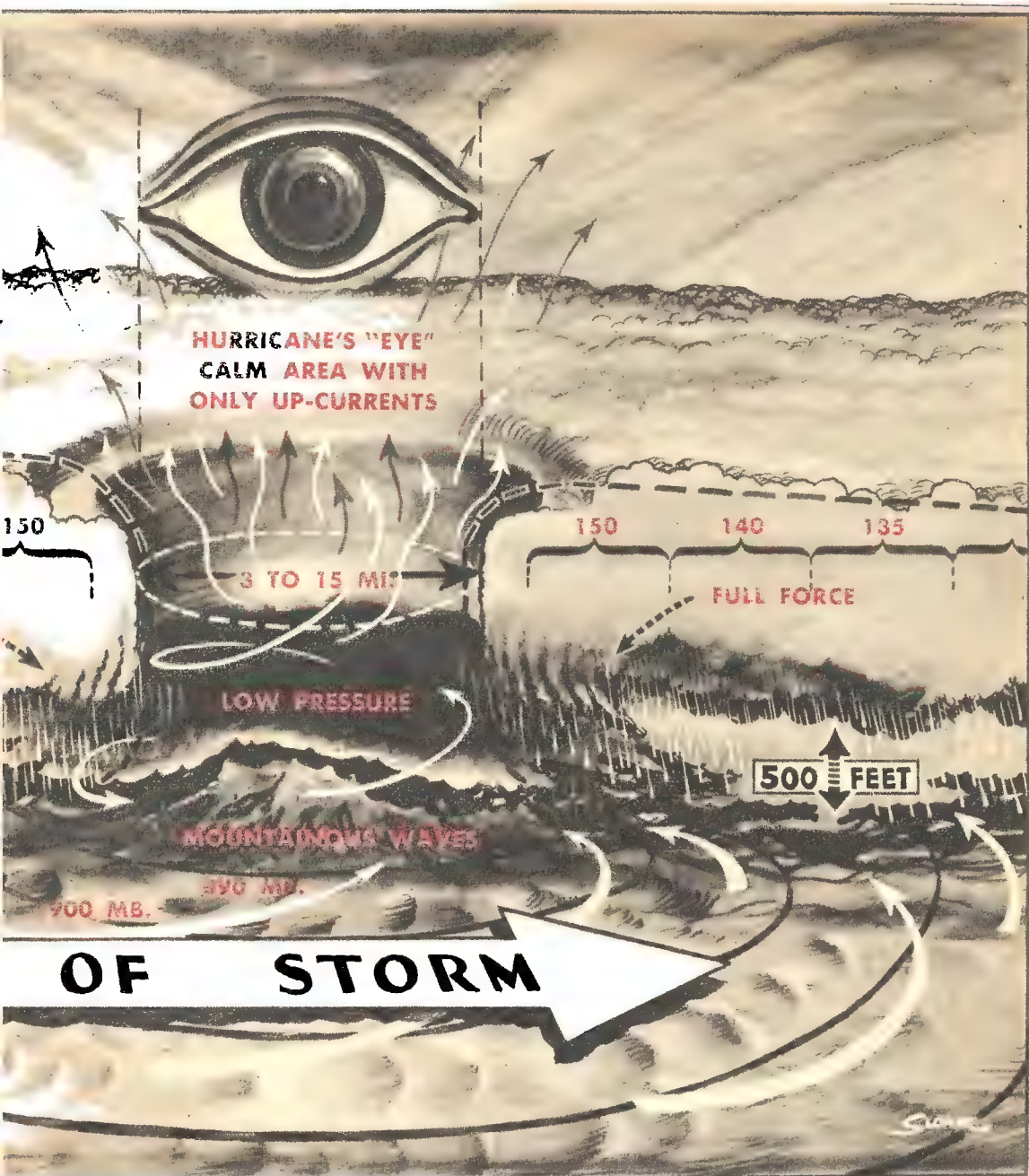
LOOKING A HURRICANE IN

by Eric Sloane

Men who flew in last September's hurricane discovered that at the heart of the storm, air currents rise, not fall.

WEATHER is probably the most illogical of the sciences. At high altitudes you will both roast and freeze at the same time; you go toward the sun only to become colder. In general the atmosphere acts like a spoiled brat, always doing the wrong thing. Little wonder then, that there are scores of doubters

Mechanix Illustrated



THE "EYE"

Photo at top left shows the "eye" of the hurricane as seen from 25,000 feet, far above the storm. Drawing shows airmen's new theory of what happens at the heart of the storm when it is at its height.

for each new discovery in meteorology, the science of the weather.

Take for instance, the mystery of the hurricane's "eye." During our recent Atlantic coast hurricane, scores of brave pilots flew near the storm and some flew straight through it in the cause of scientific research.

Their great discovery was that the famed "eye" really exists at high altitudes (over 6,000 feet), and that the currents within it were upward instead of its supposed "sink-hole" downdrafts. But were the scientists elated? Not at all. They insisted that the photos of the eye such as the one shown at

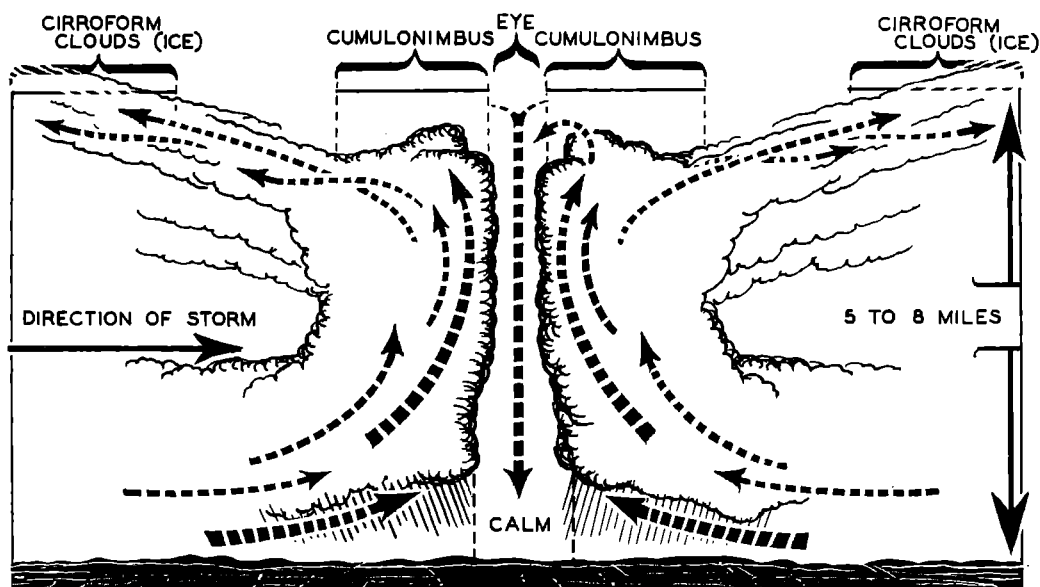


Diagram of meteorologists' present theory of the hurricane. The rotating earth drags its envelope of air along with it. When two masses of air collide, under conditions of extreme temperature and pressure differences, a hurricane results.

the top of page 42 indicated only cloud-breaks. Besides, they say, if the eye has those updrafts, why isn't there a towering cumulonimbus (thunderhead) cloud effect, with hail and ice in its head instead of just a hole? No, this looks like too calm a hole, they reason, or if it is an "eye," it looks as though the air were flowing *into* it and *downward*—no updraft there.

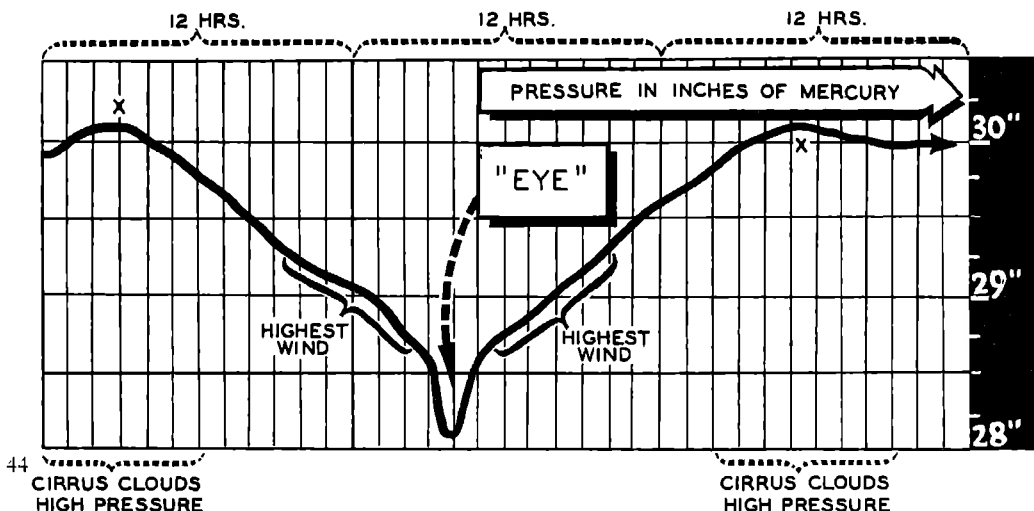
In the drawing on pages 42, 43 we see an airman's new version of the hurricane's anatomy. First analyse it, then turn over and look at the drawing, on this page, of the meteorologist's conception of the same thing. The saying that whatever goes up must come

down is well shown there, with the storm funnelling down, cresting up, and the center "eye" descending.

It does look reasonable that the wind just outside and surrounding the "eye" might ascend counterclockwise in the cumulonimbus formation while the eye itself has a steady downdraft to help feed it. The photo, remember, was taken at 25,000 feet; it shows the storm roof far below, while the meteorologist's plan shows the hurricane reaching to five or eight miles—too far for an ordinary plane to hurdle.

To understand the problem we must first know the hurricane. [Continued on page 134]

Chart shows the duration of the hurricane and the atmospheric pressure at various parts of it. At the points designated by an "X" the atmospheric pressure is going up as storm approaches.



Navy Unishops



Miniature machine shops on sleds, Unishops go to beachheads to repair damaged amphibians.

by John LaCerde

THE Navy has taken the tarpaulins off seven good reasons why Allied amphibious operations have been so successful.

Disclosed is the fact that "unishops" are in action. And unishops, you can now be told, are self-contained, self-sufficient miniature machine shops on sleds.

They are marvelously designed. Any home mechanic would give his best diamond-point drillhead to have [Continued on page 152]



The retriever Unishop has a crane and winch with which to salvage partly submerged landing craft.



Set up and ready for action, this repair unit has a powerful lathe, tarpaulin protection against rain.

Four of the seven units in a row. One repairs hulls, another fixes engines, a third puts out fires, etc.



If speed is what you want you can get it in the aptly-named Rocket, a 3-place job by Johnson Aircrafts. It cruises at 185 m.p.h., has 950 mile range, retractable tricycle landing gear, 2-way radio, flaps and a near-\$5,000 price tag.



PLANES ARE GETTING PERSONAL

(Part Two)

by Roland Cueva

INTEREST in aviation on the part of the general public, particularly with reference to individual private flying in the years to follow the war, has become so intense that more than 2,000 persons per month are now applying for student pilot licenses. That these people have faith in the future of so-called personal flying and are serious in their intentions is evidenced by the fact that each one must invest several hundred dollars, at current instruction rates, before he or she can receive the coveted private pilot's license. Noted aviation authorities have estimated that within two or three years after VE day there will be several hundred thousand qualified men and women pilots in the United States.

What has brought about this widespread desire to get up in the air? Actually, the answer lies in a combination of factors. The war, of course, has made everyone aware of aviation's over-all potentialities. But more important, from the personal standpoint, has been the development and publicizing of safe, easy-flying, low-priced lightplanes, particularly those of the spinproof type having simplified control and tricycle landing gear. These planes, coupled with an intelligent nationwide program for the development of community airparks and landing strips can bring flying, for the first time, within the reach of the average American without upsetting his normal daily life and budget.

In last month's article we discussed some of the characteristics of the simplified airplane and its chief points of difference from the conventional type, including the fact that they cannot be spun in. How did they get that way?

Spinproofing has resulted from a combination of aviation engineering achievements dating back eight or nine years, developed by Gene Vidal, John Geisse, Fred E. Weick of Engineering and Research Corporation, *Ercoupe* manufacturers, and others. The technical details are too complicated to discuss here, but briefly, they involve the previously described limited elevator travel plus a carefully worked out wing and fuselage design, center of gravity moved further forward than usual, large control surfaces, including vertical tail areas outside of propeller stream, and, in the *Ercoupe*, an engine mounted 3 degrees off center to aid control areas in neutralizing stalling tendencies. The result is a wing that stalls in the center portions, but never in the outer panels, so that aileron, or lateral control is always maintained. To you beginner pilots this means that no matter what you do wrong, the worst that can happen is a semi-stall followed by so-called "mushing" down of the plane's nose with small loss of altitude; the wings can be kept level always, and flying speed will soon be regained. (See diagram on page 42, April, 1945 MI.)

Although the simplified control, spinproof airplane's ledger reads mostly on the black side, there are a few entries in red, and these must not be overlooked—in fact, they seem to be stumbling blocks to many experienced pilots trained in conventional aircraft. The

necessary limitations on maneuverability are the cause of one loud gripe from the experts—though as previously mentioned, they should not give any John Doe flyer a moment's disappointment. Professional trapeze artists excepted. Another complaint frequently heard concerns the inability of the *Ercoupe* and similarly designed craft to sideslip, thus cutting down speed in case of a forced landing in a small space. *Skyfarer* has partially answered the problem by installing flaps, which decrease the speed and increase the lift at the same time. The best answer, however, next to slowing the ship down with the brakes after ground contact is the postwar establishment of a comprehensive nationwide system of airparks—community landing strips—as advocated by Oliver L. Parks and others.

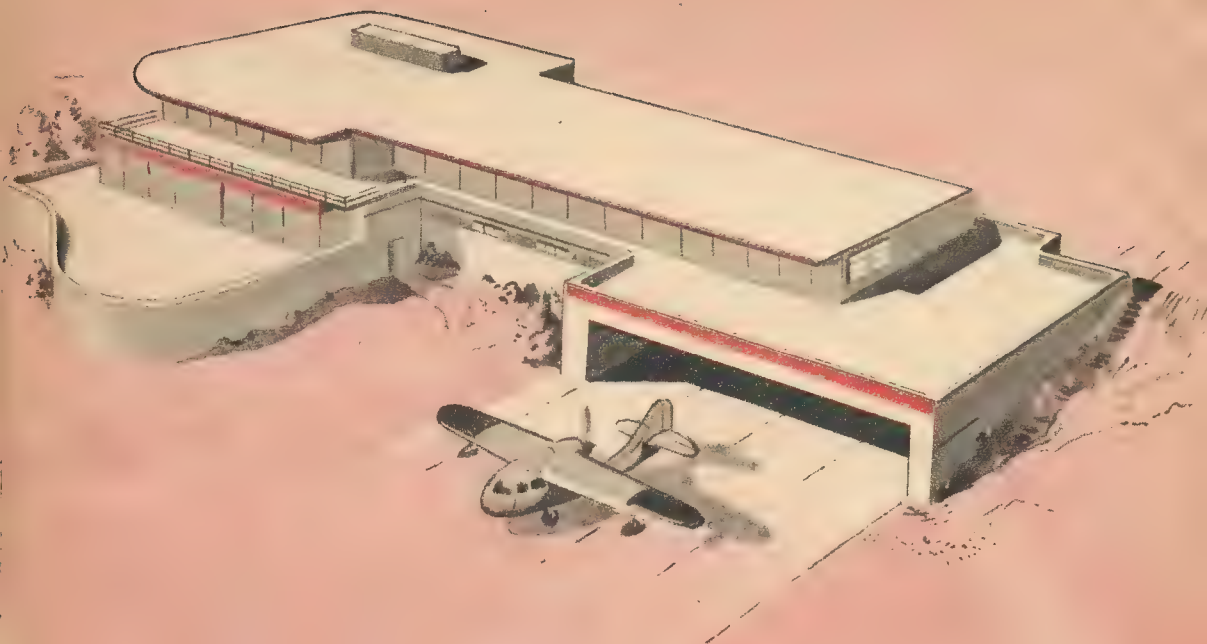
Below: Trim 2-place low wing monoplane, the Swift will travel 600 miles at 125 m.p.h. on 26 gals. of gas. It has conventional control, slots and flaps.



Designer's sketch of the M-84, Fairchild's offering to the postwar private flyer. Still in initial experimental stages, it will probably be 4-place, deluxe.



Priests will fly too, after war. Here's one of many from Canada being trained at Parks Air College. *Ercoupe* appears to be kneeling for ecclesiastical pilot.



Your personal plane, whether simplified or conventional in control, will need good housing and an adequate home ground space from which to operate. At top and bottom are ideas for the former. Sketch above shows a postwar dwelling with attached hangar and ramp leading to field or water. It was adapted from a drawing by R. H. Richards of Republic Aviation Corp. Below are prefabricated, low-cost "T-type" hangars designed by Butler Mfg. Co. Background shows good layout for a small, community airport providing facilities for private flyers.

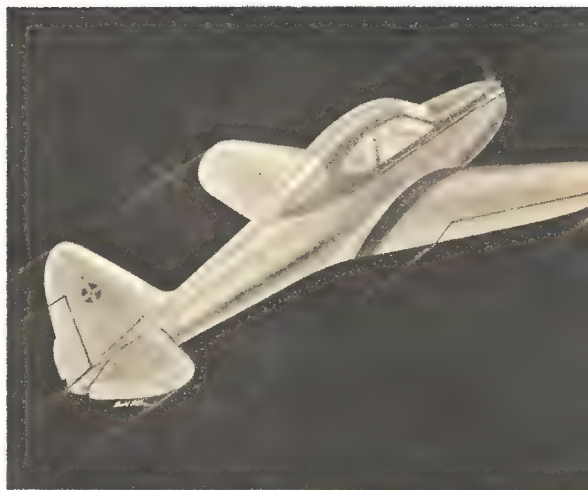


Right: The Skysedan, 4-place experimental plane being considered by Piper Aircraft for postwar. It would have all-metal frame, 165 h.p. engine, 125 mile cruising speed, 500 mile range and electric starter.

making forced landings as obsolete as running out of gas on a main highway.

Two more objections to this type of airplane must be considered. 1) A tendency to "hunt" or yaw, especially in rough air, due to lack of independent rudder control. In an airliner, this would be uncomfortable for passengers near the tail; in a two-place private plane it's hardly noticeable, and in any case will undoubtedly be engineered out of postwar designs. 2) Hard to raise nose in a steep glide with a dead engine. Unfortunately, true, due to limited elevator control and forward center of gravity, *but*—no matter how perfect airplanes ever become, the human element must somewhere enter the picture; a pilot caught in such a spot has only himself to blame, for under all normal circumstances these planes will glide nicely on a dead motor. Even this hazard could be eliminated, if necessary, by the addition of a gadget which could free the elevator for maximum travel at the pilot's discretion.

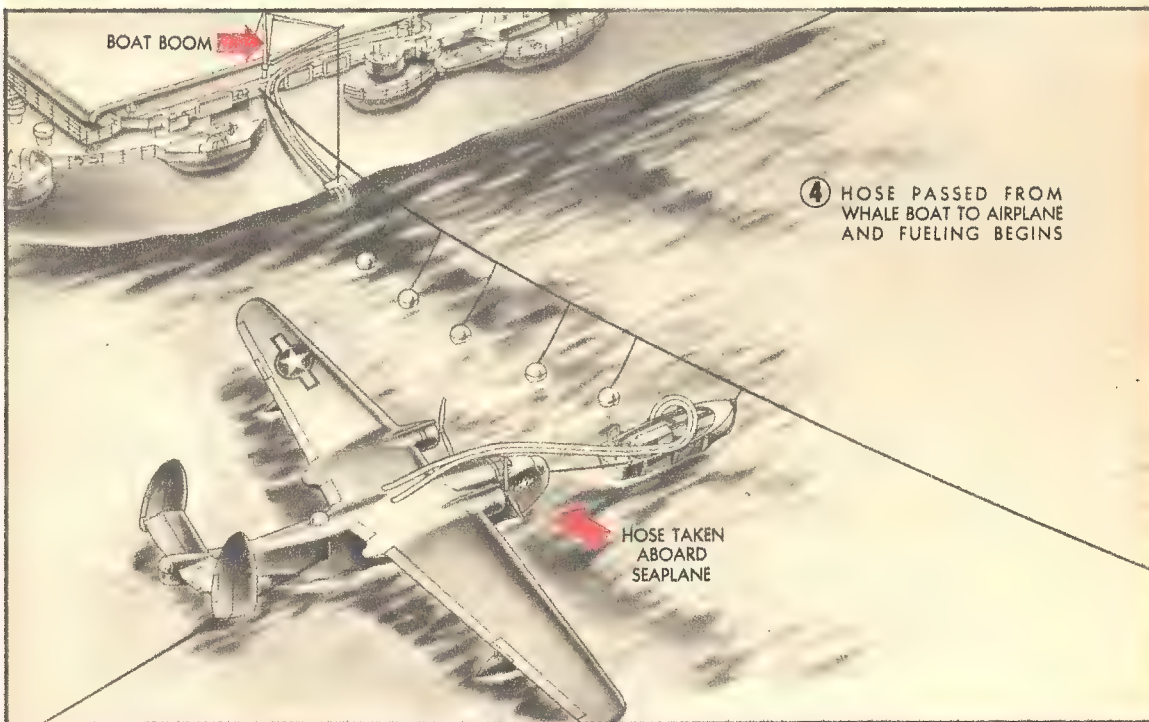
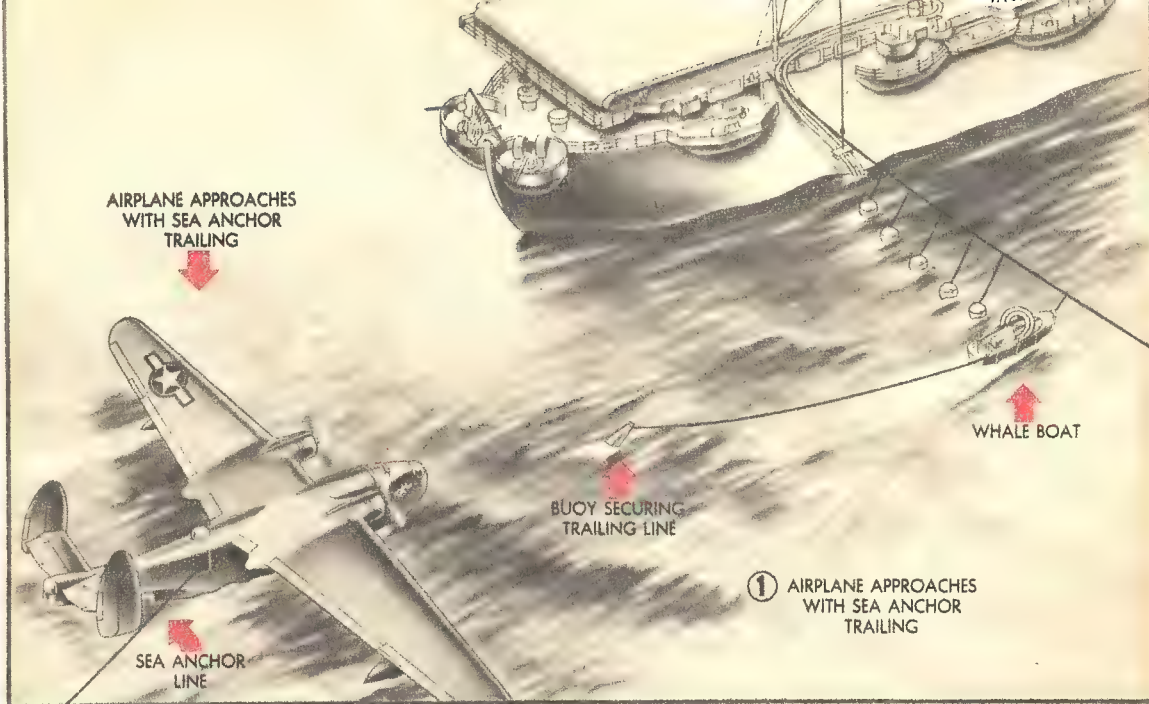
Before you decide on the type of personal plane you're going to fly in that wonderful postwar world, whether conventional or simplified, you'll want to know what it's going to cost, and how much elbow grease it will take. Here the ledger stacks up all on the simplified side, except in initial cost, based on prewar standards. Probable purchase prices soon after the war will range from \$1,500 for a conventional job like the Piper Cub to \$4,000 for the four place Republic Thunderbolt amphibian. Simplified control airplanes, with all-metal frame and fuselage, will range from \$2,000 to \$3,000. These figures will be lowered within a year or so after armistice, when *quantity* production gets under way. When it comes to flight training and upkeep, the story is more definite. The CAA requires 8 hours dual prior to solo and total of 35 hours flying time before a private pilot's license can be granted for a conventional plane. On the other hand, you can get a license to fly an *Ercoupe* with only 25 hours total, including 5 hours dual before solo. This means a saving of at least \$100 in training costs, not to mention 10 hours of flying time—equivalent to five or six weeks for business men and women whose spare time is strictly limited. Upkeep on both types is moderate, except for hangar rent, which averages about \$25 per month at a commercial airport. In-



Another Piper hat in the ring is the Skycycle, single-place, 40 h.p. monoplane with conventional control, plastic and aluminum monocoque fuselage. Price would be very low, cruising speed about 95 m.p.m.

surance generally runs to 10% of cost price and .02 per mile covers direct running expense, according to Parks Air College records for *Ercoupes*. The latter includes gas, oil, repair material and labor. A plane with metal skin is more economical than a fabric covered job because it won't require the expense of re-covering after a few years at an average cost of \$400-\$500.

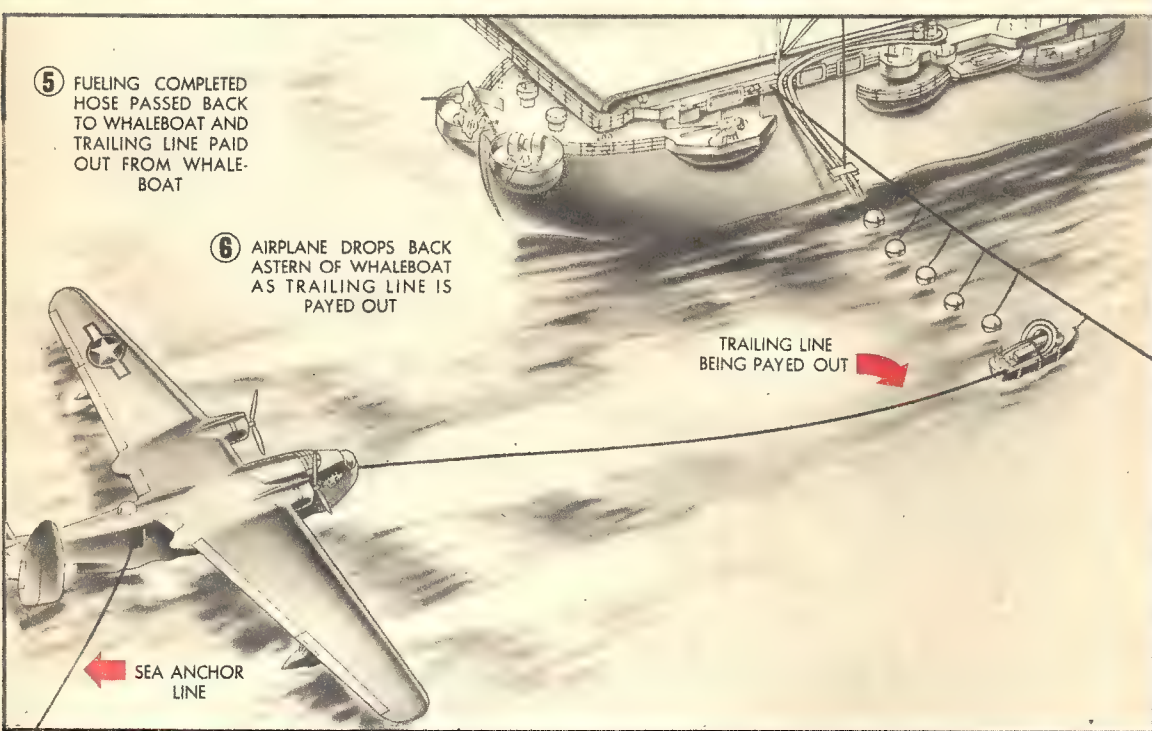
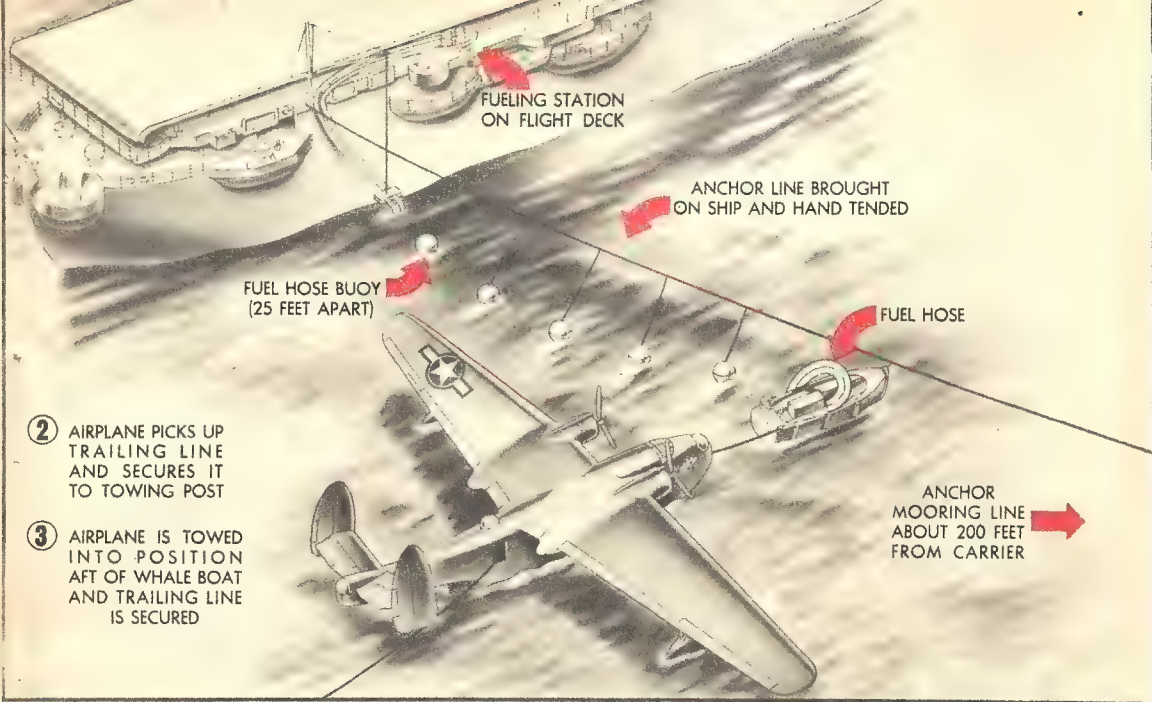
While the simplified control, spinproof airplane appears about to provide a happy future for the embryo private flyer, its possibilities as far as commercial airline carriers are concerned are more doubtful. A survey conducted by the author among the major U. S. airlines brought forth 14 courteous and mixed viewpoints [*Continued on page 139*]



REFUELING ON THE RUN

U. S. CARRIERS and tankers are now serving as mid-ocean "filling stations," handling the tricky business of issuing gasoline to other craft while cruising at submarine-dodging speeds in enemy waters. This refueling technique greatly extends the operating range of the flying

Mechanix Illustrated



boats and small surface ships which the Navy is using to patrol vast fighting areas in the Pacific. In the four drawings above are shown the main operations in refueling one of the Navy's biggest flying boats—a Martin Mariner.

Informed by radio that the Mariner

would like to drop down for a drink, the carrier, without reducing its speed, puts out two whale boats to which has been attached a heavy mooring line. To one of the boats are also attached two fuel hoses. Pulling away on the leeward side, the whale boats [Continued on page 150]

by John Maguire

Comes V-Day, a vast array of destructive tools, from flamethrowers to dive bombers, will be hurled into the blitz against forest fires.

THE vast stock of tools of destruction built up by the United States in the past few years will not all be tossed into the discard when peace comes. A tremendous, never-ending peacetime war—the nationwide fight against forest

fires—will make immediate inroads on our war-weapon stockpiles.

Sparked by the researches of David P. Godwin of the United States Forest Service, men of the forest industries have been dreaming of V-day since

This drawing visualizes a postwar forest fire, with all the deadly machines of war combatting it. Flamethrowers start back fires, bulldozers dig trenches for firebreaks, a helicopter sprays chemicals, personnel is rushed to the scene by jeep, half-track, transport plane. Overhead medium bombers drop sticks of flame-quenching bombs; crews are directed by walkie-talkie.



FIGHTING **FIRE** WITH **FIRE**





Sturdy bulldozer clearing a fire lane to stem the spread of a roaring fire threatening a large Northwest forest.



A smoke jumper, carrying fire-extinguishing equipment, sails down over a forest in Montana.

An Oregon logger demonstrating use of flamethrower as device for starting slash fire.



Pearl Harbor. They plan to equip their fire-fighting forces with planes, jeeps, half-tracks, walkie-talkie radio sets and other devices hitherto used chiefly to spread death and misery. Even the deadly flamethrower is slated for an important role in this postwar drama of the woods.

New techniques for getting the jump on fires in their early stages stem largely from lessons learned in the war. The order of attack on a forest fire in postwar days will closely approximate approved military tactics, in addition to utilizing effective military tools.

When a fire tower lookout discovers a "smoke," his telephone radio warning will be received at the nearest fire station. Within ten or fifteen minutes, a plane—or several planes—will soar over the area, peel off, and go into a flaps-down, "dive bombing" attack on the smoking woods.

Although dive bombing, with bombs that were nothing more than exploding fire extinguishers, was tried out some years ago, it did not prove too successful. Hitting the vital targets accurately was difficult, at that time.

Now, however, with precision-engineered bombsights due to be a glut on the postwar market, and with thousands of highly skilled pilots and bombardiers home from the wars, results will be much more effective.

If the fire has gained too much headway for the dive bombers, or if conditions of terrain or other factors prevent efficient dive bombing, whole fleets of medium bombers will be called into action in many locations, to literally blanket the area with chemical "fire-out" bombs.

In a succeeding wave will arrive huge transports, carrying squads [*Continued on page 66*]



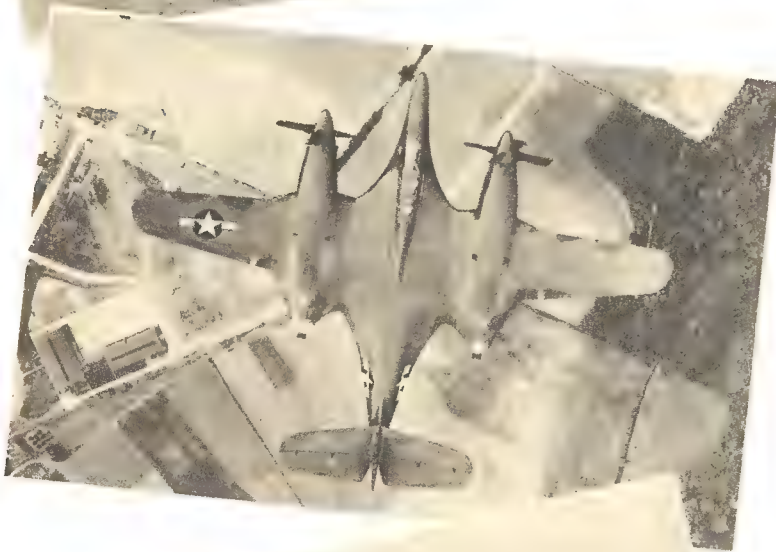
Television Antenna 1,250 feet in the air on the top of the Empire State building in New York City. It is used by station WBNT to broadcast television shows. Sound is sent out from the broken circular bar near the top of the tower. The egg-shaped projections beneath transmit the video waves. The great height of the tower gives the maximum range of effective telecasting.



FLYING



THE ATSC has just released information on six experimental planes which have been abandoned for use against the Axis. Left is the XP-75 which was planned to use P-40's wings, P-51's fuselage, F4U's landing gear, A-24's tail. Has 3,000 HP Allison engine.



THE McDonnell XP-67, a single seat interceptor built for a battery of fixed cannon, is a test of the flying wing principle. It has a nacelle design which permits a certain amount of forward thrust from a jet of exhaust gases. The long range fighter carries 6 .37mm. cannon.



LATERAL controls and elevator are at the wing tips of the Northrop XP-56, another flying wing design. The 3-bladed counter-rotating pusher-type props mounted on a single shaft are driven by a radial engine, weight of which is concentrated amidships.

FREAKS

THE 3-blade prop on this pusher-type Curtiss XP-55 can be jettisoned by the pilot if he has to jump. Vertical stabilizers on the wing tips replace the conventional rudder. Elevator controls are in the nose. Guns in nose need not be synchronized with prop blades.



THERE'S an elevator to get in and out of the cockpit on this Vultee XP-54. The bottom is hinged and lowers the pilot seat electrically. Twin-boomed, with a flush-riveted skin and a wing with extremely low drag, plane has an in-line Lycoming engine.



BABY of the lot is the XP-77, only American all-wood plane developed in this war. Bell-built, it was projected when metal shortage loomed as critical, has a hollow prop shaft to permit use of single cannon. It has greater maneuverability than Jap Zero.



He Puts Up A Battle

[Continued from page 41]

The son of a Spanish father and a French mother, de Florez was born in 1889 near New York's historic Washington Square. What with learning English in school and hearing his parents speak their native tongues at home, he grew up speaking all three languages fluently. When he was eight, his family took him for a short trip to Europe. This trip lasted five years, during which he was subjected to a series of Jesuit tutors all of whom appeared to be interested solely in teaching young de Florez the sciences of electricity and higher mathematics. De Florez sopped up the information like a blotter, and it turned out to be just the right spark to set his dormant inventive talents into eruption. Before long, he had invented an electric fly catcher, an alarm system that had bells ringing all over the house at all hours of the night, a contraption that poked wooden arms out of closets to ward off intruders, and a mild version of a penitentiary electric chair.

It was while he was a sophomore at MIT that de Florez made his entrance into aviation. It was characteristically spectacular. Chancing upon an aeronautical exhibition where a glider of questionable airworthiness was about to be demonstrated, he promptly offered to take the place of the pilot who, at the last moment, was found to be mysteriously missing. Tossed 40 feet into the air by means of a tow rope manned by a group of husky attendants, de Florez floated gracefully about for a moment before going into a nose dive and crashing headlong into the earth. Rushing up to salvage what was left of him, the attendants were amazed not only to see him step from the wreckage completely unharmed but to hear him announce to the opened mouthed spectators that aviation was unquestionably the coming thing.

After graduating from MIT as a mechanical engineer, de Florez floated around from one job to another before finally landing with a firm which had been trying, with singular unsuccess, to obtain gasoline by "cracking" kerosene. Taking the matter into his own hands with his usual confidence, de Florez attacked the problem from a new angle and sure enough was soon producing the desired gasoline. The formula he developed then is still the basis of much of today's cracking. Delighted with their new-found wonder boy, de Florez's employers raised his salary from twenty-five to thirty-five dollars a week and named him manager of their new cracking plant which they decided they would build in London.

It was while he was in London that World War I broke out and that de Florez came up with the first three of the many inventions that he was to develop for military purposes. Noting one day that the British anti-aircraft guns had no sights to speak of and were merely fired in the general direction of any German aircraft that appeared overhead, de Florez took an afternoon off from work, designed the first accurate anti-aircraft

gunsight, and had it installed on the guns that were guarding his plant. Shortly after that he was informed by the amazed British authorities that one of his guns had not only scored several direct hits on a German Zeppelin, but had riddled it so badly as to actually bring it to the ground. Rather pleased with his success, de Florez turned his thoughts more to military inventing. A few weeks later he emerged with a flame thrower which, even today, is considered standard equipment by every well-ordnanced army.

His third invention, which turned out to be extremely timely, is the only discovery that de Florez has ever stumbled upon by accident. One day while cracking kerosene, he found that instead of the usual gasoline, he had produced a batch of toluol—an important ingredient of TNT, and a substance of which the British munitions makers were in desperate need at the moment. With the British authorities heckling him day and night for the secret of his invaluable mistake, de Florez patiently reconstructed the steps of his work and eventually came up with plans showing how toluol, which up to then had been derivable only in small quantities from coal tar, could be obtained from petroleum in almost unlimited amounts.

Shortly after the U. S. entered the war, de Florez returned to this country and went to work for the Navy as a civilian engineer whose job it was to improve Navy planes in any way he could. Working under men whose encouragement fanned his inventive ability to a white heat, de Florez turned out one vital invention after another, including the first shoulder harness and the first safety belt. Before the war was over he had developed 39 important aviation instruments and accessories. He turned them all over to the Navy. Some of them are still standard equipment on Navy planes.

With the signing of the armistice, and his subsequent release from the Navy, it occurred to de Florez, for the first time in his life, to take stock of himself. He was astounded with what he discovered. Although an inventor of dozens of machines and methods that were worth millions of dollars to commercial companies and governments, he found himself a young man of twenty-nine who couldn't raise a hundred dollars if he pawned everything he owned. He decided that from then on things would have to be different. Looking up some Boston banking connections he had made while at MIT, he wangled himself a good job as engineer of some oil properties that were in need of extensive development. Following the same pattern he had always followed, he began to turn out one valuable invention after another, including a vertical furnace, a temperature control for firing furnaces, and a number of safety drilling systems. This time, however, he

[Continued on page 141]

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Do Soldiers Fear Hypnosis?

[Continued from page 37]

Besides his role of detective, the psychiatrist must also become a kind of playwright, reconstructing the subterranean drama that lies behind each patient's illness out of the fragmentary memories and re-enacted scenes that are brought to light during the hypnotic trance. Take the case of the seaman. Dr. Fisher, purely through dramatic instinct, drastically shortened the entire treatment by guessing that the "black outs" or attacks of amnesia were in some manner crucial moments in the seaman's psychic life.

So, after hypnotizing him, Dr. Fisher had him re-live the events leading up to and during the amnesic attacks. Immediately it became apparent, from the vivid enactment the sailor performed under hypnosis, that the cause of his mental trouble was traceable to the salient fact that each time he had lost consciousness, it had been the sight of two valves that set off the psychic explosion in his mind.

In the next hypnotic session Dr. Fisher, mindful of the clue already unearthed, requested the seaman to re-enact what had happened to him during the actual torpedoing. Displaying all the emotional intensity he had felt during the original experience, the seaman again lived through those stifling, terror-laden minutes when he had been trapped in the engine room of a rapidly sinking ship. And time and again he returned to one insistent theme: whether or not he had really turned off the valves that controlled the ship's boilers before he escaped.

Here was the source of his illness! The conflict between his fear and his sense of duty, which produces the majority of war neuroses, was graphically expressed by the repetition of two simple but dramatic sentences: "I better go back and see. No, I better go overboard." Now that Dr. Fisher had uncovered the crucial, or as psychiatrists put it, the "traumatic" episode, he could go on and effect a cure.

What has just been described is the "uncovering" or "acting out" method of hypnoanalysis. But when that method fails, hypnotism has by no means exhausted the procedures at its disposal. The simplest and most widely used technique is that of direct, post-hypnotic suggestion; the hypnotist convincing the patient while under hypnosis that his illness will vanish when he awakens.

If you think that this sounds far-fetched, here is the testimony of Drs. Margaret Brenman and Merton M. Gill, Menninger Clinic psychiatrists: on the basis of extensive research they say that almost every known disease from asthma to epilepsy has been caused to disappear by this almost magical means!

Scientists are not lavish with explanations of the power of suggestion; most times they'll tell you that they know it works, whatever it is. From the

innumerable examples that might be instanced, here's one from the psychological laboratory of Andrew Slater, practicing hypnotist. Slater hypnotized a young woman and told her that when she returned to her normal state she would be stone deaf. A gun was fired frequently right behind her head and she didn't even flutter an eyelash. To double check, pulse counts were taken, showing her beat to be even and normal throughout the gun firing. Now just apply the same tactic to organic disease and, given reasonably favorable conditions, the disease will literally be driven out by the post-hypnotic suggestion.

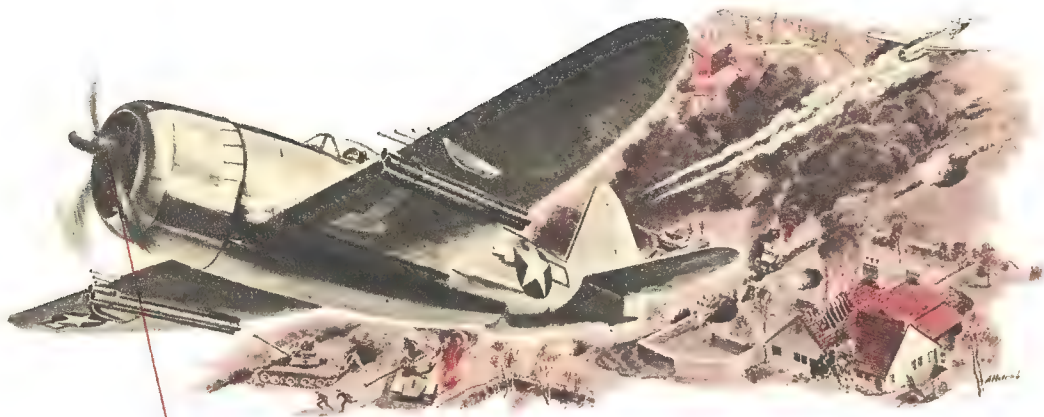
Of course, there are conditioning factors at work; not all persons react to the hypnotist with the same intensity. Some will go under very quickly, arriving at a state of rigid immobility in a short time; while others take much longer and then only reach a point halfway on the road to complete trance. The ideal hypnotic subject has been described by Dr. Bramwell: he has a fair intelligence, is usually under 50 years of age, does not have great difficulty in concentrating, and is, above all, willing to cooperate in the experiment.

Which brings us to the biggest obstacle in the forward path of hypnoanalysis—the false and outlandish ideas that the layman, educated by the more fanciful comic strips, has accumulated. The standard foggy notions are succinctly summarized by Dr. Fisher, who has encountered all variations on the theme in his work with hundreds of merchant marine casualties. Some men objected to hypnosis on the ground that once asleep they would never wake up again. Others thought that while in the trance they might commit criminal acts. More imaginative fellows dreamed up the idea that if they once succumbed to the hypnotist they would be forever in his power.

All of these ideas are as insubstantial as moonshine and phony as a seven dollar bill. The hypnotic state can never result in perpetual sleep for, even if the subject is not "brought back" by the hypnotist, the trance will eventually wear off by itself. As for committing criminal or silly acts, the potential hypnotic subject can rest easy. Under the hypnotic trance we control our actions by the same moral code that guides us during our everyday behavior. And any command or suggestion that contradicts this moral code will not be obeyed.

But the layman is not wholly to be blamed. Such fantastic misconceptions can be traced to the atmosphere of impenetrable mystery and blackest magic which has enshrouded the subject since the days of Anton Mesmer, the discoverer of hypnotism. The average man heard nothing about the many surgical operations performed with hypnosis used as an anaesthetic. Instead, he

[Continued on page 65]



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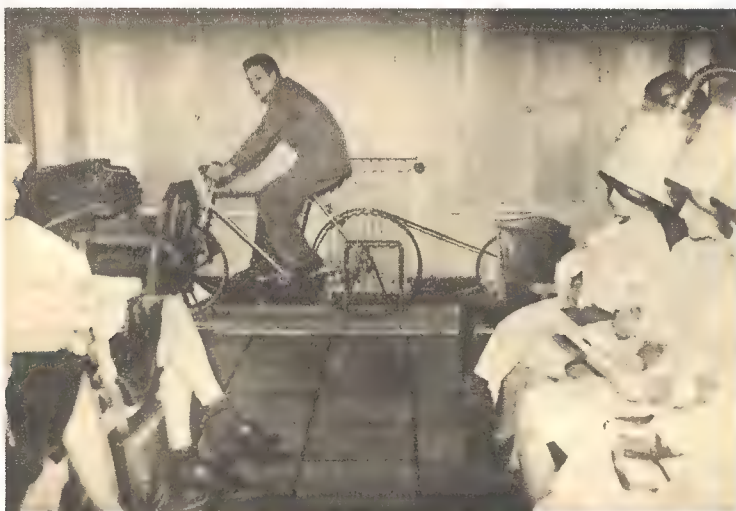


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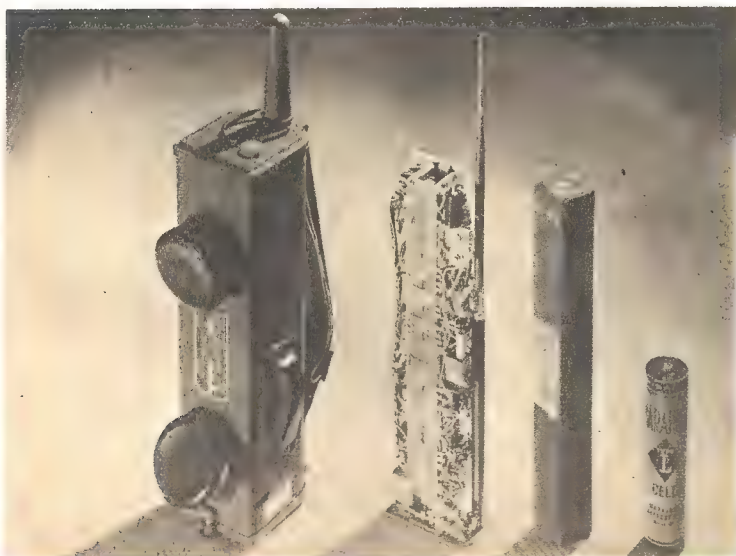
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Leg Power replaces electricity in this Parisian beauty salon, where Madame has her hair dried despite the lack of coal-generated current. An ingenious beautician hires unemployed 6-day bicycle racers to peddle away on a bike, the back wheel of which is attached to a small generator! The current runs 6 driers.

Sea Still for men adrift on the ocean, which produces fresh water from salt. Small enough to be packed in a pocket-sized can and weighing but a pound, the still is a plastic bag which, when inflated, is filled with sea water. Small, hexagonal sponges on a plastic screen absorb the water, which evaporates under the sun's heat leaving the salt in the sponges. Still will make quart of water in 8 hours.



"Handie Talkie"

comes out of its case to show its remarkably compact construction. The 5-tube sending and receiving radio telephone weighs only slightly more than 5 pounds, but contains 585 tiny parts. The batteries which operate it have a life of 12½ hours.

"Privateer"

(PB4Y-2) is the latest land-based Navy patrol bomber. Top speed is over 250 MPH, range, well over 3,000 miles. Gross weight is from 31 to 32½ tons. Fuselage 7 feet longer than original Liberator provides extra space for radio and detection equipment.



"Jump Bottle" for stratosphere fliers. New, improved streamlined oxygen bottle assembly allows airmen to bail out from as high as 40,000 feet with the assurance that their oxygen supply will stick with them all the way down. The new H-2 assembly shown above plugs right into the standard oxygen mask, which affords protection against frostbite and hailstones after jumping. Capacity has been increased to 22 cubic inches.

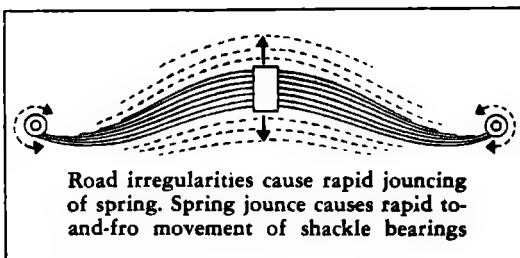


Water Jet is a new method of exploding beach mines. Devised by the British Army, it uses sea water under high pressure from monitors on wheeled carriages fitted with armored cabs. The two men who operate them direct, by periscope, the jet of water at the minefield from 20 yards away.



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Do Soldiers Fear Hypnosis?

[Continued from page 60]

read novels like George Du Maurier's "Trilby," in whose highly-colored pages the long-haired, glittering-eyed Svengali exercised his awful powers. He did not know that long before the First World War Jean Charcot, famous French neurologist, was curing cases of nervous hysteria by hypnosis. But he did read with fascination and amused skepticism of the tremendous potency conferred upon the magical wavings of hands by comic-strip artists with overheated imaginations.

Once the misconceptions of the layman have been cleared away, the most puzzling scientific question still remains unanswered: What actually happens to the hypnotic subject before and during the hypnotic state?

It's easy enough to describe the procedure of the hypnotist, which hasn't varied a great deal since the discovery of the art. Everyone knows how the hypnotist puts the subject in a dimly lighted room, seats him in a comfortable chair, tells him to look fixedly at one object, and then repeats over and over again in a steady monotonous voice the suggestion that he go to sleep. But more difficult to understand is the mysterious and truly remarkable transformation that takes place in the hypnotic subject, from the beginning of the hypnotic seance, when he falls into a light sleep, until the fully developed hypnotic state, when he seems to once again assume his normal personality.

Medical science has been divided up until now into two hostile camps. One group, composed of the followers of Freud's teachings, say that the answer can be found in the emotional relationship that develops between the hypnotist and the person being hypnotized. They see hypnosis as very much like the emotion of love: the absence of criticism, the blind obedience, the withdrawal of interest from the world in general by the hypnotic subject and his exclusive concentration on the hypnotist, are all emotional reactions true of both states. Another group takes up a diametrically opposite stand, arguing that physiological factors, an altered condition of the brain or the influence of the left ventricle of the heart, are responsible for the hypnotic state.

And now a recently published scientific paper in the *American Journal of Psychiatry* attempts to compromise between the warring positions by making a synthesis of the two points of view. This paper, the outcome of intensive experimental work with hypnosis by two psychoanalysts, Drs. Lawrence S. Kubie and Sidney Margolin, might well mark a revolutionary turning point in the entire history and understanding of the hypnotic state. For the doctors advance the astonishing contention that hypnosis is simply the intensification of a fundamentally normal process, the process of concentration, and should be obtained in

the future by the use of simple physical procedures, dispensing with the hypnotist himself!

Have you ever fallen asleep in a railroad train, lulled by the regular, monotonous rhythm of the clanking wheels, being awakened every time the train stopped at a station? Well, according to Drs. Kubie and Margolin, you were experiencing the same thing that a hypnotic subject does, when he is put into a trance and is subsequently awakened by the hypnotist. Or have you ever noticed a baby being rocked to sleep in his mother's arms? And how quickly the baby awakens when his mother stops rocking him?

Break down the process involved in both these ordinary, everyday happenings, and what you have are the psycho-physiological elements that go to produce the hypnotic state. Thus hypnosis, in its induction stage, can be compared to a kind of sleep in which communication with the outside world is mechanically limited, by means of monotonously repeated verbal suggestions and prolonged immobility, to one person—the hypnotist. In the doctor's graphic image, the subject becomes a telephone switchboard with only one plug in.

But how does this explain the still-mysterious power of the hypnotist? Drs. Kubie and Margolin emphatically deny that the hypnotist is *directly* wielding any power at all over his subject. What happens is a wonderfully complex and subtle psychological metamorphosis within the subject.

All of us in our ordinary wakeful lives maintain our personalities, our egos, through the various sensory channels of communication with the world around us, our senses of hearing, seeing, and so on. But under hypnosis the wall between the ego and the outer world becomes dim and fragile, after a while it completely dissolves. Which means that the personality of the hypnotic subject becomes vague and ill-defined.

At this point the almost-magical transformation takes place! Like a sponge sopping up water, the subject's diffused and amorphous personality absorbs and incorporates the personality of the hypnotist as a part of himself. So, when he hears the hypnotist telling him what to do, he imagines that it is his own voice issuing commands, his own desires that are being carried out. The "power" of the hypnotist is an illusion, since in actuality the hypnotized person thinks that the hypnotist has become an integral part of himself!

This also accounts for the remarkable change that comes over the hypnotic subject, after he passes from the light sleep of the first stage of hypnosis into the fully developed hypnotic trance. Now he no longer remains motionless and silent; he walks, talks, acts in general as though there were no hidden tie binding him to the hypnotist. His ego has again expanded and his sensory

[Continued on page 66]

Do Soldiers Fear Hypnosis?

[Continued from page 65]

communication with the outside world has returned to its normal state. But one decisive element of the induction stage still remains intact. The subject carries around inside of him—like a secret will—a still, small voice of conscience, the personality of the hypnotist which has become merged and interwoven into his own personality.

This startling theory is still being hotly discussed by all the medical practitioners of hypnosis, though most of them would go along with its main points. But Drs. Kubie and Margolin, like all scientists on the track of new discoveries, have not waited for the laggards in the medical ranks to catch up with their exploratory flight into the uncharted and mysterious regions of hypnosis. As proof of their contention that hypnosis can be obtained by simple physical procedures, they have already invented and patented a machine that induces a hypnagogic state, that transition period between sleep and wakefulness when ideas and images flow swiftly through the mind.

The machine is based on the fact that the rhythm of one's breathing is an important sleep-producing stimulus. The patient's own breath sounds are picked up by a contact microphone placed over his neck, amplified, and brought back to him through earphones. He has his attention sharply focused by silently thinking, "In, out, one, two," in time with the rhythmic rise and fall of his own breathing. In a short while, he falls into the hypnagogic trance and freely expresses the ideas and images that crowd his mind. Drs. Kubie and Margolin have used this machine to great effect with neurotic patients who were reluctant to talk about what was bothering them.

And now the next logical step for the scientific control of hypnosis is the invention of a machine that will produce the full hypnotic state—without the hypnotist!

You have just read the first complete and up-to-the-minute report on the wonders of hypnoanalysis, as used in the armed forces. Many of the fascinating details of this new healing science could only be touched upon in this article. The editors of MI, feeling this subject is of extraordinary importance, have asked Mr. Montherlant to prepare another report on "narcohypnosis," the use of drugs to induce hypnosis, a technique widely used by Army and Navy doctors today. You will find this second article even more absorbing than this month's. It will appear in an early issue of MI. Watch for it!

Fighting Fire With Fire

[Continued from page 54]

of firefighting paratroopers. Pre-war experiments produced good results with this mode of attack, and the parachute brigades are sure to loom large in postwar fire control. Certainly there will be plenty of experienced "leapers" on hand.

Protected by plastic masks, padded helmets and non-rip clothing, and equipped with rope to lower themselves from treetops, the paratroopers will bring into play portable pack-back water tanks. Pressured by small hand pumps, or by carbon dioxide in liquid form or as dry ice, these tanks should suffice for most small blazes. Some portable extinguishers, incidentally, use carbon dioxide, a fire-smothering agent, as the extinguishing element.

A quick word or two on the paratroopers' walkie-talkie—vital for speedy communication among fire chiefs, ground crews and air forces—will result in the appearance of the ungainly helicopter, with more and larger extinguishers, as needed.

Already the hovering, wingless helicopter has been used to spray trees against insect pests, and it may yet be employed to spray chemical extinguishing fluids on certain types of fire that are difficult to fight from the ground.

Meanwhile, the jeeps and half-tracks, trucks and bulldozers, will be converging on the area, butting their way over narrow mountain trails and through seemingly impassable undergrowth, carrying in reinforcements and supplies. Perhaps they'll be hauling flamethrowers for starting back fires, or long lines of hose and high pressure pumps. The ubiquitous jeep will certainly see much use, to transport crews and as a miniature fire engine. No section of America's forests is likely to be any rougher on a jeep than the sands of Africa, the jungles of New Guinea or the mountains of Sicily—and foresters have no doubt the rugged jeep will stand up to any assignment.

Half-tracks, which combine automobile speed, tank traction and tractor working ability, are slated for use as bulldozers, to scrape firebreaks. Bulldozers are already standard equipment for the forest firemen.

If the fire gets into the tree tops, becoming a "crown" fire, it is almost impossible to combat by water or chemicals. In many forests, a crown fire may be as high above ground as the 15th story of a skyscraper, with plenty of oxygen to grow on and plenty of wind to help it spread.

Should this happen, another wave of paratroopers and ground forces will be called on. Their job will be to build big back fires, and dig great trenches, as firebreaks. Men with flamethrowers will start the back fires, and other crew members with fire extinguishers will keep them from burning the wrong way.

Members of this firefighting platoon will use motor-driven saws to clear big trees from the

[Continued on page 138]



Costume Jewelry

by Ann Colbert

Mosell may have Hollywood's bauble trade, but you can start one of your own right in your home workshop.

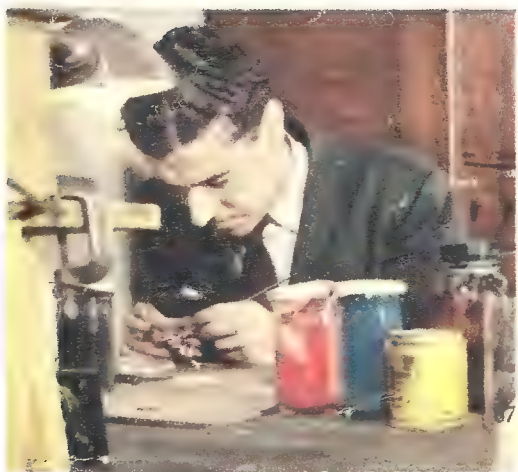
"THERE isn't a thing under the sun that can't be made into a piece of jewelry," says Frederic Mosell, and he has proved it. He has put street lamps, mirrors, mailboxes, door knockers, animals, even a hurdy-gurdy and an opera box on women's lapels—and they love it.

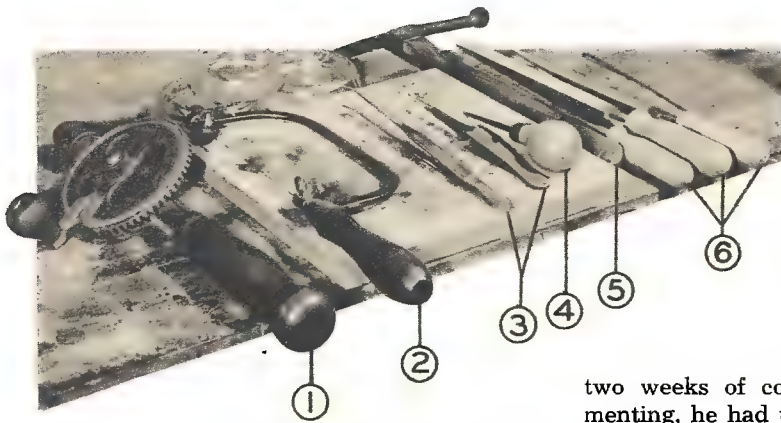
The youngest child of jewelry—costume jewelry—has grown up and established itself. It is no longer the stepchild, good only for those who can't afford the real thing and have to be content with imitation. The smartest and richest women today wear costume jewelry, buy it as an accessory, like a bag or a pair of gloves.

Five years ago, Frederic Mosell started making jewelry in the kitchen of his New York apartment. Half a year later, his pieces were in such demand that he had to open a workshop and go into quantity production. Probably the most imaginative designer of costume jewelry in the country, Mosell



A few of Mosell's world-famous designs are shown in the top photo. He symbolizes actual things and events in his colorful pins and ear clasps. Above: Matched flower set. Below: Mosell sets stones in clip.





Here are the simple tools required: 1- drill; 2- jeweler's saw; 3- tongs; 4- icepick; 5- small hammer; 6- files. A soldering iron or torch is also necessary.

learned how to make his own jewelry the hard way; through trial, error and experience. He still talks about the most difficult piece he ever made, an angel pin. He had the idea ready in his head. It had to be a baroque angel, because "they have the nicest curves," he says. After searching for days, he finally found the type of angel he wanted—on a china candlestick. He bought the candlestick, started to remove the angel, and accidentally knocked it into dozens of pieces. He patiently glued the pieces together again.



After design is transferred to sheet metal, pattern is sawn to shape with jeweler's saw.

Sand is packed in frames and pattern sharply impressed by locking flask and pressing sand. Flask is then opened, pattern removed and "gates" or channels for molten metal flow are cut.



copied the angel in metal and put it in a sand mold. It didn't come out—it had too many undercuts. He cast it again, this time in several sections. Now it came out all right, but when he put the pieces together the angel weighed over two pounds! Finally, after

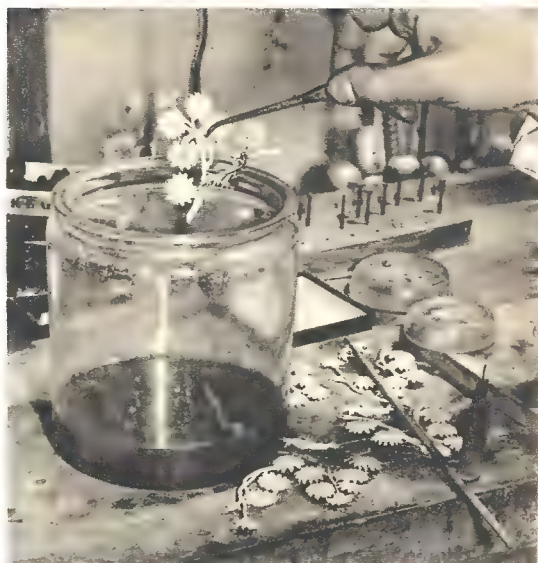
two weeks of constant worry and experimenting, he had the piece exactly as he had pictured it in his mind.

During the five years that Mosell has been making jewelry, he has created hundreds of pieces of outstanding originality. A true replica of the Versailles Palace clock became a lapel watch; the streetlights of Paris were made into a lapel pin with hand beveled glass panes and luminous little rods that shine up in the dark. (This pin was such a hit that he later made pins of Hollywood and New York streetlights too.) A lion has a mane made of gold chains; early American door knockers make beautiful earrings in gold or silver finish. A frog pond has water lilies and green enameled, bejeweled frogs sitting at its edge; the same frogs make matching earrings.

Whether he takes a walk, goes to a show or reads a paper, Mosell always has jewelry on his mind. When he saw a single black swan on New York's Central Park lake, he made a swan pin, enameled it black and set it with rhinestones. When he read in the paper that the Metropolitan Opera season was about to open, he made a pin "A Night at the Opera," a gold, jewel-set opera box with a man and woman inside, peering through rhinestone opera glasses.



Metal is melted over hot, open flame and poured into flask. Both flask and crucible are held with tongs. White metal, babbitt or type metal can be melted on an ordinary gas range, as their melting points are low.



After filing casting to finished shape, resulting piece gets chemical cleansing bath and is then buffed with powered pumice. Piece above was cast in two parts, later soldered together. Clasp is attached to back.

There is no restriction to the materials he combines with metal to get a startling effect. Graceful little ballerinas have skirts made of white tulle; a rooster's tail is made of real feathers; a dainty filagree fan is backed with black lace; a baroque looking glass pin has a real mirror. One of his most famous pins was the replica of a hurdy-gurdy, complete with organ grinder and monkey, and a little music box inside that actually played. Opera star Helen Jepson has one of the few dozens he made—until the available stock of imported Swiss music boxes gave out.

Mosell likes best to work in white metal because it lends itself superbly to the intricate designs he dreams up. When the War Production Board, in 1942, stopped jewelry manufacturers from using white metal, he turned to silver, mastered this process with the same perserverance that helped him overcome production difficulties at the time of the angel pin.

We called on Frederic Mosell at his New York workshop, watched him make the daisy pin shown in the photos. It isn't as difficult as you might think, and with a little patience and practice you'll be able to turn out lovely pieces in your own home or workshop.

First step is the design. Sketch the piece you want to make, in the desired size. Copy it on a piece of tracing paper. While doing this, calculate in how many parts you are

going to have to make the piece of jewelry. Flat pieces present no problem, they can be cast in one piece; but if you want to mold a model that has undercuts, you will have to make it in as many [Continued on page 146]



Frances Langford, popular singing star, sports Mosell's ballerina pins. They are gold color, set with rhinestones in bodice of dress. Skirt is of white tulle.

GERMAN JETS

by Gilbert Paüst

M. I. Aviation Editor

Nazi jet-propelled fighters have been flying since 1942. Our pilots have learned to respect the Me-262, He-280 and rocket fighter Me-163





Me-163 is world's first rocket fighter. Some models, with warhead in nose, are used for ramming; pilot-ejector device, operated by push button, catapults pilot to safety. Wheels drop after take-off; plane lands on skid.

HIGH in the air over the German Reich a formation of Fortresses is carrying its cargo of explosives to dump upon a vital Allied objective. Still higher above them hovers their protecting escort of fighters.

Suddenly, there appears a streak of flame below them.

It increases in size as it approaches the heavy bombers, and then it flashes through the formation, leaving a thin line of exhaust gases in its wake.

It turns, and heads toward the lead Fortress.

Above, the fighters dive to defend their charges from this new, mysterious menace. The turrets of the Fortress turn toward it and the sky is momentarily lined with the thin trails of tracer shells as it comes within range of the "50s."

Never swerving, it speeds straight for the large plane. There is a heavy explosion as it strikes, and the Fortress, a flaming mass of wreckage, disappears from view.



Below, a tiny Nazi parachute billows open and carries the pilot earthward.

Here we have seen in action a new weapon of the Luftwaffe, the Messerschmitt Me-163 rocket fighter.

It must have come as quite a shock to American readers some little time ago when newspapers carried stories of German jet-planes in action over the Western Front. In most discussions of the relatively new principle of jet propulsion for aircraft, we have been led to believe that America and England lead the field in this new achievement. To Frank Whittle has gone the credit for developing the first such power unit. We have been told about the Bell P-59 Aircomet and the British Gloster, and suspect that many more Allied fighters of this type are being planned.

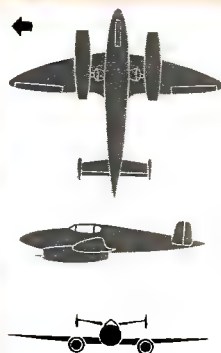
But German science has not been asleep in this field. When the present war started in 1939, Nazi engineers were hard at work over their drawing boards, laying out plans for jet-propelled fighters. Flying models received their first tests as early as 1942. Still previous

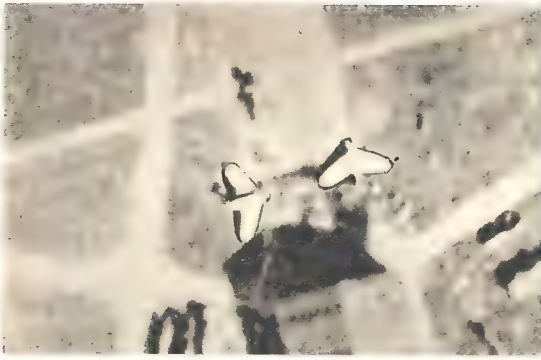
to this date, in 1941, Ernst Udet, famous German ace of World War I, lost his life in the crash of one of these original test designs.

In 1944, three new fighters took over the defense of the German homeland. One of these, probably a direct result of experiments on jet types, is the Me-163, the world's first successful rocket plane. It is a small ship, approaching the design of the flying wing, with a 30-foot wing span and a short fuselage mounting a fin and rudder assembly but no horizontal tail surfaces. The rocket power plant is installed in the fuselage, and is fed by a liquid fuel containing the oxygen necessary for combustion. The wheels which support the plane on the ground are dropped immediately after take-off, and a skid is used for landing.

The range of this plane is very short; it is propelled by bursts from its rocket engine rather than by a steady jet impulse. Its speed is reported as being over 500 m.p.h. and its rate of climb is phenomenal. Two types of armament are reported. One is composed of two heavy cannon, which the fighter uses in

Me-262 (top) and He-280 (bottom) are jet-propelled aircraft, also equipped with pilot-ejector mechanism. These models carry jet units slung beneath wings, are heavily armed and are reported to have speeds approaching 500 m.p.h.





First photo of rocket fighters shows two flying wing Me-263s resting near hangar on field at Peenemunde.



Me-262s near runway at Lechfeld air field in Bavaria, important center of Me-262 jet aircraft development.

hit-and-run attacks; the other consists of a warhead placed in the nose of the plane. This type is used for ramming. The pilot jockeys into a favorable position for attack, and then hurls his plane at the enemy. When a few hundred yards from his target, he manipulates a control which blows off the plane's hatch by means of an explosive charge, and a second later a catapult device tosses him backward into the air, whereupon he parachutes to earth. Score: one small German fighter sacrificed for an Allied heavy bomber.

The other two fighters are the single-seat, twin-jet Messerschmitt Me-262 and Heinkel He-280. These are true jet aircraft, employing the same turbine principle of propulsion as the Whittle design and depending upon the oxygen in the atmosphere for combustion. They differ from our own Airacomet in that their power units are mounted out on the wings rather than adjacent to the fuselage.

The Me-262 is a low-wing aircraft with slight wing dihedral, almost square wing tips, a very slim fuselage and tricycle landing gear. Wing span is estimated at 40 feet. Its range is greater than that of the Me-163, but its speed, also, approaches 500 m.p.h. Armament is four heavy cannon mounted in the nose and light bombs held in racks under the wings. Its turbine units are believed to be of Junkers manufacture.

The He-280 differs from the Me-262 in that it has the elliptical wing plan form characteristic of Heinkel aircraft, and twin fins set at the ends of the tail stabilizer. The latter has been given a slight dihedral. The cockpit is faired into the fuselage in the rear instead of having the blister shape of that of the Messerschmitt. Wing span is reported to be less than that of its companion, and its

jet units are of different manufacture. Allied pilots maintain that it is not as "clean" an aircraft as the Me-262, and that its speed and performance are not as outstanding. It, too, is equipped with tricycle landing gear.

Both of these jet planes use the pilot-ejector device installed in the Me-163 and said to be used, also, in the recent models of the conventional aircraft of the ever-dwindling Luftwaffe. The Nazis have come to consider their planes more expendable than their pilots.

In action, these jets actually do not present the slick, streamlined appearance shown in the drawings; their silhouettes are marred by huge auxiliary fuel tanks which they must carry beneath their wings to give them a practical range. These offer a large resisting surface to the airflow, and doubtless prevent the planes from attaining a speed even higher than 500 m.p.h.

The German jets are used solely for defense against Allied daylight raiders. Their short range has made it impossible for them to stray too far from their bases. Have they been successful in stopping our attacks? The answer is "no."

Their efforts have met with comparative failure due to their limited number, and their pilots' lack of experience.

However, there is no doubt the Germans are ahead of us in the field of jet propulsion as shown not only by these planes, but also by their ingenious buzz-bomb. Should the war continue for any great length of time, this fact might have dire consequences. General Eisenhower has said, "If we don't get into jet propulsion manufacture soon, or before the Germans get into mass production, it will be a serious matter." We must heed his warning!

HIGHBALLING THE HALF-PINTS



One corner of the huge layout of the New York Society of Model Engineers shows the roundhouse, the table on which it is mounted, and its foreman. Repairs and adjustments go on constantly.

by Fred Ripperda

Pictures by J. J. Fanta, John Beinert and George Nelson

WONDER what has happened to Number 34?" Bill Tucker, the lightning slinger—operator to you—at Furnace, a small station on the Western R. R., leaned over the control board and looked down the gleaming track, trying to catch the familiar sound of an approaching train. But no rumble of distant chugging pierced the stillness of the mountain division.

Many trains stopped at Furnace, not from any wish to spare the few travelminded citizens the trouble of hiking twelve miles to the nearest station, but be-

cause the small community happened to be located at the foot of the road's longest and toughest grade. All freight locomotives had to take water before the climb, so a water tank was installed. All the heavy freight drags barely made the top, so 311 and 318



The curve on this main line looks completely realistic.

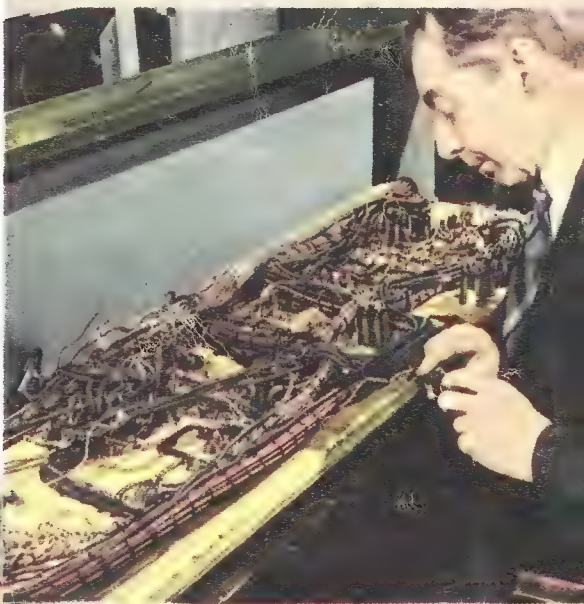
Building and operating an accurate scale model railroad is a far cry from "playing with trains."

were assigned as permanent helpers. Since this arrangement called for sidings, a shed, and the usual equipment for the upkeep of two hard-working locomotives, the officials thought they might as well throw in a small depot and place an operator in charge of the whole set-up.

Bill glanced again at his train orders. Yes, everything was taken care of. The westbound freight was waiting on the siding, as per instructions, so that the eastbound passenger train might have a clear board. The operator at Coal Bin had warned him that it would be through in a matter of seconds, because Number 34 had been reported ahead of schedule. Bill knew that the eagle eye at the throttle of the all-Pullman train was Mike Barney, known along the road as the Philosopher, whose obvious sayings included such words of wisdom as, "A minute gained is a minute gained." A second telephone call added to Bill's woes: "Westbound freight consisting of 40 empties has three 70-ton gondolas. Assume your siding can hold it." It would not have done him much good to express any doubts as to the capacity of



Lights on control panels show operators location of every train on the tracks. Two men are required to operate the elaborate system.



There's a mile of wiring requiring constant and expert attention. Control panels have as much wire as telephone switchboard.

The drawbridge over which the Express is pounding is accurate in every detail and is electrically operated by remote control.





This outdoor model railroad has 200 yards of track and 75 cars. Remotely controlled by telephone and telegraph, it runs through complete model villages.



An elaborate station on the railroad in the English model village of "Bekenscot" in Buckinghamshire. England was first country to make scale model trains.

the Furnace tracks, because no sooner had he hung up than the bulky Mikado nosed into the siding. Well, it worked with the caboose clearing the main by a few inches. With a sigh of relief Bill had settled down to wait for Number 34. Staring blankly at a battered U.P. hopper, he cursed the endless difficulties of handling heavy traffic over a single track mountain pike. He was just about to indulge in a bit of self-pity when a faint rumble announced the arrival of the string of varnish. A few seconds later the huge Northern-type

locomotive and its eight cars shot out of the short tunnel and thundered by, while the spinning drivers translated old Barney's defiance of the 40 m.p.h. rule into breathtaking action.

All there was left to do, at least for the time being, was to highball the freight and arrange for a new meet.

This incident took place in Bill Tucker's spacious basement. The railroad is about fifteen years old and like all well planned pikes, it will never be finished. The road is built to $\frac{1}{4}$ " scale corresponding to a track gauge of $1\frac{1}{4}$ inch.

It all started on a sunny spring day. Bill came down to breakfast and somewhat shyly broke the news that "he had been bitten by the railroad bug." Realizing that this statement called for some more down-to-earth explanation, he gave a long—and well prepared—expose of the dreadful conditions prevailing in the basement because of the absence of a railroad. How could small localities like Coal Bin, Furnace, Washtub and many others ever expand without the benefit of adequate rail service? Mrs. Tucker was deeply upset. Think of it! Her Bill wanted to play with toy trains! What would their friends think!

It should be said right here that the bug mentioned is the carrier of a germ that causes a serious disease known as Modelrailroaditis to which medical science has as yet found no cure. Bill knew this. In spite of his friends' sarcasm and his wife's increasing concern, he placed the preliminary orders for lumber, ties, rails and spikes.

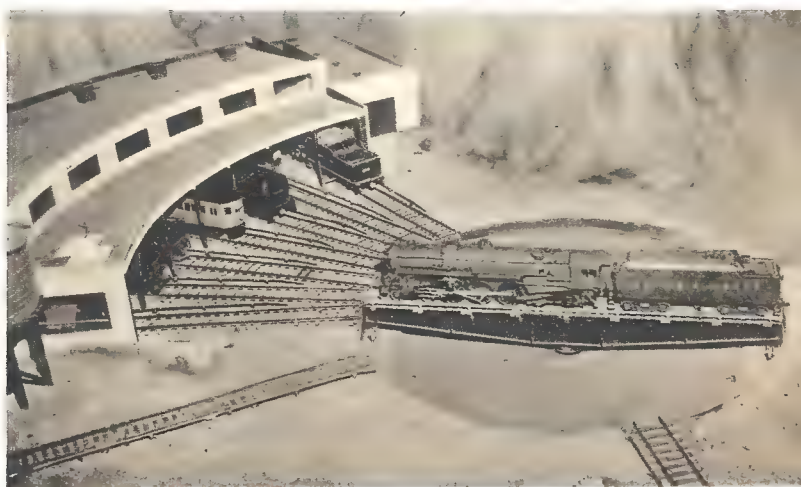
Today 875 feet of track (110 O-gauge feet represent a real-life mile), 22 switches, mountains, fields, forests, lakes, small towns, stations, yards, roundhouses and bridges have changed the entire basement into a scale model of a section of our country. The Western has progressed steadily. Its motive power consists of twenty locomotives ranging from small Diesel switchers to powerful Mallet articulated locomotives for heavy duty. Although fully equipped for today's requirements, the road has many possibilities for expansion.



100 members belong to the Boston club which owns this layout, which has 2,000 feet of track, 12 engines.

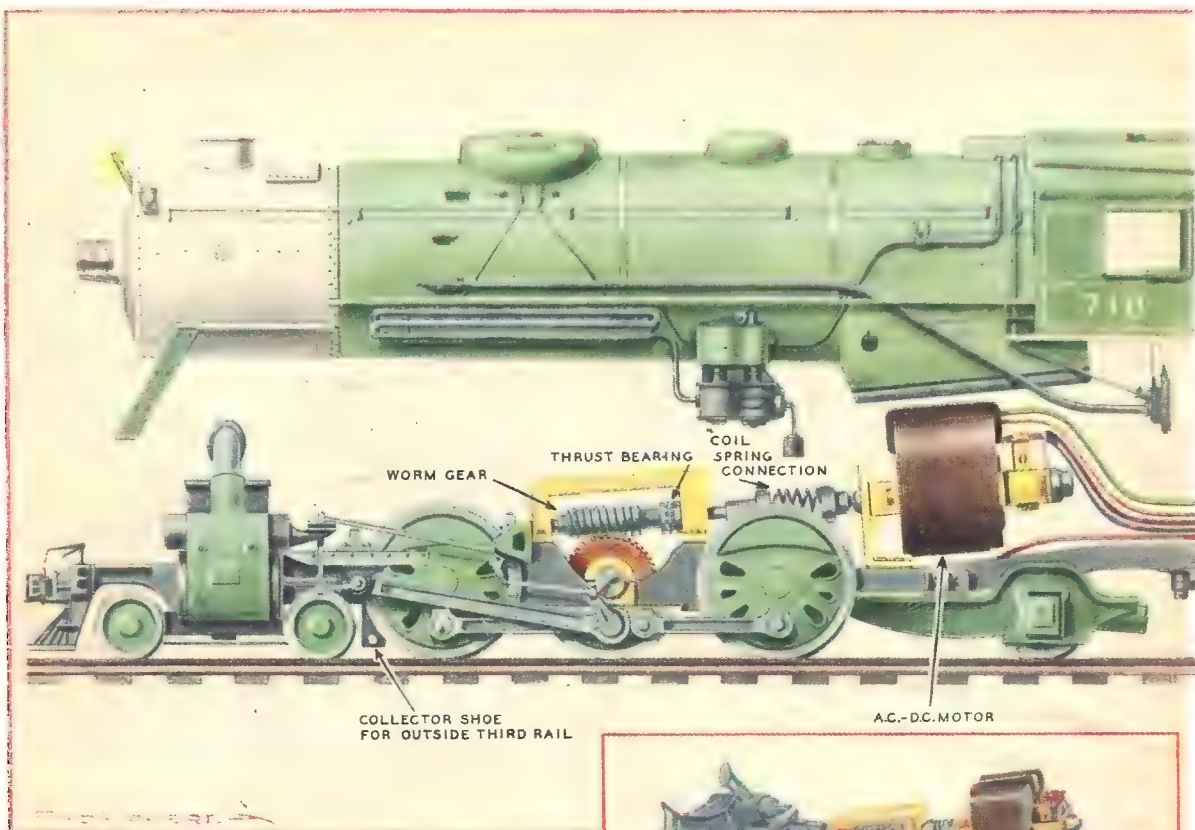
There are about 100,000 Bill Tuckers in America, some with basements, attics or vacant garages. Others are forced to confine their activities to more modest quarters, while a third category consists of men who form clubs and operate huge and elaborate layouts. There are 96 model railroad clubs in the United States. Chicago leads with five clubs; Los Angeles is next with four. Where did model railroading originate? America, as one of the youngest countries in the field, cannot make any claim in this respect.

There are many reasons to believe that England is the birthplace of this fascinating hobby that has shown a continuous growth for the past three decades. It is, of course, impossible to state with certainty where and when scenic toy train layouts appeared for the first time; but since most model railroaders insist on scale track and correctly detailed motive power and rolling stock, it is

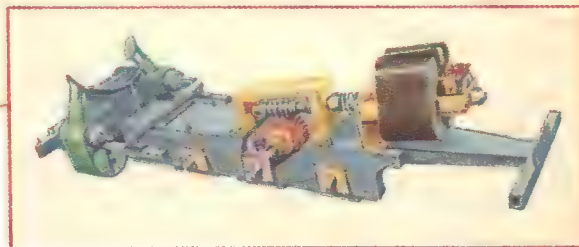


Closeup of layout of Boston Model Railroad Society shows turntable and roundhouse for repair of damaged engines.

safe to assume that the first scale model railroads were built in the country that manufactured miniature locomotives and cars on a commercial basis. Years ago, when even expensive electric toy trains could hardly be classified as true miniatures of existing types, a few British manufacturers turned out magnificently detailed scale locomotives propelled by steam, clockwork mechanism, or electricity. Only the latter gained in popularity because of the remote control possibilities. These models had scaled wheels instead of the oversized ones found on tinplate trains,



Exploded drawing of the construction of a typical O-gauge locomotive shows: wiring for both AC and DC operation; spring connection between motor and gears, which assures a smooth start; use made of locomotive tender. Models are usually built from kits.



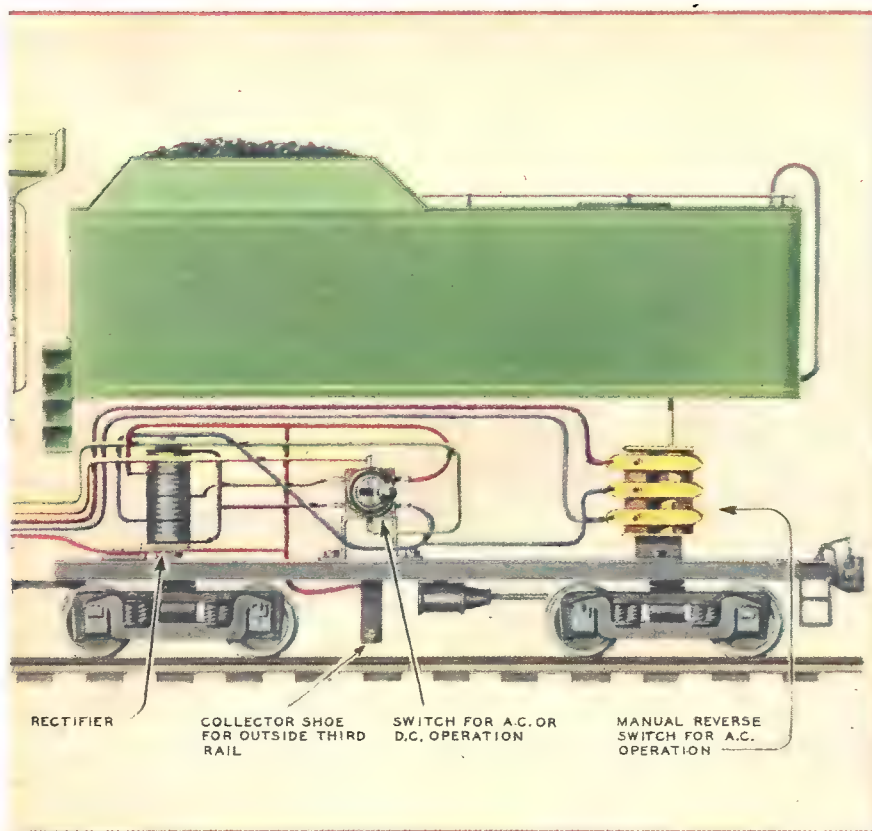
correct rods, and valve motion. Solid rails laid on stained wood ties replaced the ready-made tinplate track. The high price of these exclusive models accounts for the still prevailing belief that model railroading is an

expensive hobby. It certainly was in those days! During a short stay in England in 1933, the writer had the opportunity to see a 1¼" gauge layout that, although still in the stage of construction, had cost approximately \$8,000. Each locomotive was custom built according to the owner's own specifications and cost about \$375.

The development of model railroading during the past twenty years has been amazing. Not only are there model railroaders practically all over the world, but the manufacturing of models and equipment has grown



An O-gauge Mallet articulated locomotive being tested.



to the point where it may truly be called an industry. Until the war halted production, a number of well established American firms was putting out a great variety of fine locomotives and cars, ready to run or in kit form. True-to-scale steel rails could be bought at comparatively low cost, and finished intricate trackwork was available to the less skilled railroaders.

Other manufacturers specialized in scenic structures of all kinds and artificial earth, grass, trees and shrubs. A wide range of fine electric equipment was put on the market, and books and hundreds of

articles were written on operation and landscaping.

The creation of The National Model Railroad Association was the first important milestone to be reached. This miniature American Railroad Association, with its several thousand members, established rules and standards to which model railroaders as well as all manufacturers adhere.

Yet such remarks as, "Call it what you like, it's nothing but playing with electric trains," can still be heard. This leads to the question: What is Model Railroading?

Some years ago the writer had the occasion to define the hobby as follows:

Model railroading is creative work. No matter how small the layout, how modest the conditions under which it is built, it is a section of the world in a nutshell. It is a miniature myth-

Fred Ripperda, MI staff artist, operates one of two lathes in his fully equipped apartment workshop, which measures only 6'x9'.





A strikingly realistic section of a model layout. Bridge at top is of poured concrete, just like the real thing; one at bottom is of steel girder construction.

ical territory; its scenery contains everything the builder values. Twenty square inches planted with artificial pines, become a large and cool forest; the little cardboard cottage on the shore of a peaceful lake, amid green, silent mountains and snow capped peaks, is the home he dreams of. The prim track winding through huge rocks, the daring bridges leaping deep gorges, the busy yards, the magnificent terminals—all are the fruits of his skill and craftsmanship. It is an empire, and he, its builder."

This definition is just as fitting today, but a great deal more can be said.

Model railroading is bringing real operation into your home or your club. Outsiders often ask if we do not get tired "just running trains." We certainly would if we ran them aimlessly. A well-built Broadway Limited or any other crack train racing through an equally well-landscaped countryside is an uplifting sight, but in the long run it is bound to become dangerously monotonous.

A model pike must have a purpose, and that purpose must be clearly defined before the

first tie has been glued down. You may wish to build a branch line linking a small community to a main line, or you may have taken a fancy to a certain section of an existing road. The former presents, however, far greater possibilities, being a point to point proposition.

But whatever may be the choice, the idea is to operate your road just like the real one. This requires a good knowledge of railroading, but even if it means many months of studying, it is worth it.

Smaller layouts can be operated by one person, but two or three are preferable. Large club layouts require a regular staff.

The Maintenance of Way Department is responsible for the construction and maintenance of the track, bridges, stations and other structures. The entire railroad is divided into sections, each assigned to a section foreman.

The Transportation Department is under the supreme command of the trainmaster, to whom all questions about the timetable must be referred. It is his duty to



An HO gauge freight engine, built from a kit, pulls a long line of cars over a wooden trestle.

see that dispatchers get trains out on time.

The roundhouse foreman is responsible for the condition of the motive power and must make sure that locomotives are ready to run at time called to take out trains. He is also responsible for minor repairs on all engines running into the terminal.

The make-up of each train is the responsibility of the yardmaster, who also supervises the yard engine crew at his terminal.

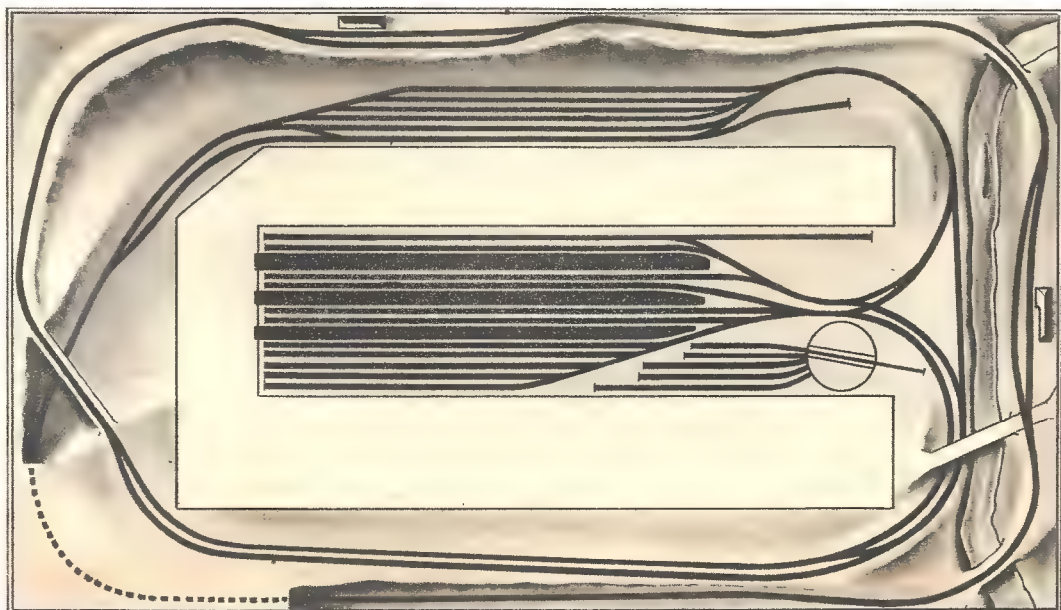
The handling of freight trains along the

line is as professional as if a real "skipper" resided in the tiny caboose.

If an accident happens somewhere on the road, the alarm is sounded and the wrecker pulls out.

Each station and tower has an operator whose duties are almost identical with those of a real one. An intricate control board enables him to operate the switches, signals and blocks within his section, while a track diagram shows him the correct position of the trains on the entire layout. In some cases

Drawing of a typical O-gauge layout designed to fit into a space 17'x30' with a 3 foot minimum radius. In the center is the passenger terminal (with three platforms), and a turntable. Interior white spaces are working areas for operators. Above are freight yards.





Tower operator of the Milwaukee Model Railroad Club gives a clear board to the "Hiawatha," a crack streamliner.



Though most modelmakers are intensely conservative, prefer conventional-type locomotives, a few copy Bel Geddes' designs like this.

each operator has a special "scale" clock.

An inter-communicating telephone line is established between all stations and towers. As on the real railroads, the line is kept open so that everyone can hear what is going on.

Some clubs end meetings with a general discussion. Praise is given where deserved, and demerits are distributed when rules have been broken or orders overlooked.

The three most popular gauges used in

modern model railroad-
ing are:

O-gauge which measures $1\frac{1}{4}$ inches between the rails. OO-gauge which measures $\frac{3}{4}$ inch between the rails. HO-gauge which measures 16.5 mills between the rails.

HO-gauge has proved to be a blessing when only limited space is available.

Since all HO power runs on direct current, remote control becomes a simple matter. The motors used in OO and O gauge locomotives will run on either alternating or direct current. When AC is used, the reversing of the engine is controlled by a switch operated by hand or by an electro-magnet installed in the locomotive. The addition of a small rectifier, usually located in the boiler or in the tender, changes the set-up to DC operation. Reversing is then accomplished by changing the polarity at the tracks.

Until quite recently, three-rail operation was predominant. Three-rail means two running rails and a third power rail. While it was perfectly in order to run a steam outline locomotive on a three-rail track also used by electric commuters' trains, the unsightly pick-up or collector shoes did much to spoil the looks

of the engine. For this and many other reasons, the two-rail system has become more and more popular in spite of certain mechanical difficulties in building the locomotives and the more complicated track wiring.

As the name indicates, a two-rail system has only the two running rails, one being the power rail. All the left hand locomotive wheels are insulated (the drivers at the rim and the truck wheels [*Continued on page 152*])

CRAFTS AND HOBBIES

LS MFT*

Pleasant sailing is designed into this new Crosby dinghy.

LS MFT is eleven feet long by four feet, five and a half inches beam and carries roughly seventy-seven square feet of sail. The rig is high and narrow and she would make a fine little boat for lake sailing in protected waters. She is decidedly not meant to sail under rough conditions as the rig is too high and no side deck is provided making it relatively easy to capsize her under heavy wind and sea conditions. She has a vee bottom and is designed to take quarter inch waterproof plywood, but may be built with ordinary planking if so desired. One thing is highly important; the metal centerboard. Don't try sailing LS MFT with a wood centerboard because she will not have the necessary stability. That heavy centerboard acts as ballast and will make it possible to drive her to windward in moderately heavy winds. By climbing out to windward, skipper and crew, if sufficiently skilled, could sail her through almost anything.

The first step in construction is to make the frames. One of the drawings shows these with all necessary dimensions. Draw them full size on a sheet of plywood or building

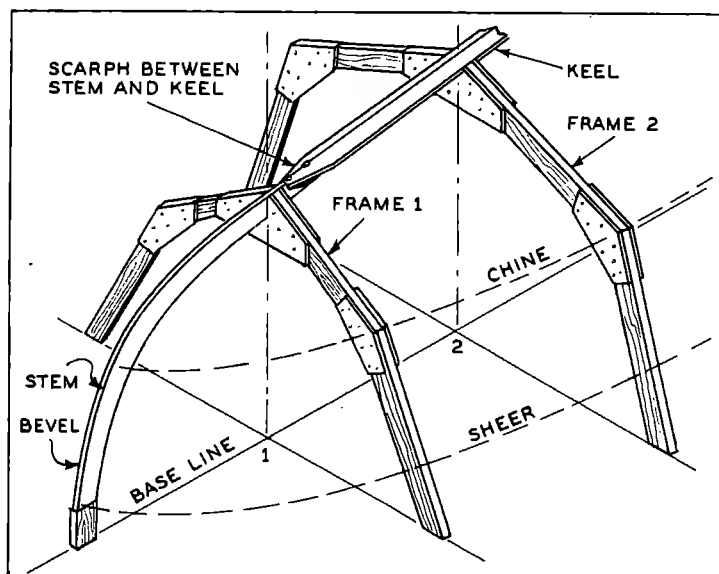


by William F. Crosby

paper, marking in first the centerline and the base line. Then measure up from base line to the various points as given, sheer, chine and keel. Then measure out from the centerline at the sheer and chine to where these dimensions cross the vertical dimensions. Connect the various points of intersection with straight lines and you have the shape of the frames.

These frames may be made from waterproof plywood in one piece from gunwale to gunwale or they may be made up as shown in the drawings, with side pieces and bottom pieces joined together with gussets glued and

*Little Sailboat Means Fine Time. Drawing above shows sail plan and scaled top view of hull. Correct positioning of mast step and partner gives the 5° rake indicated on drawing. Three stays brace mast.



Details of bow section framing. Built up frames shown with plywood gussets. Extra frame stock to base line is trimmed at sheer when finished.

screwed together. Notches are cut in the corner of each frame at the chines and also for the keel. Other notches are cut for the lighter stringer that runs along the sheer. Sizes are shown approximately, but may vary slightly without any bad effects. The transom or stern board may be made of one piece of mahogany or plywood about three-quarters of an inch thick. On the inside of this transom, you will screw cheek pieces the same size as the frames across the bottom and the sides. The gussets are omitted. Chine and sheer stringers as well as the keel notch into these but not into the transom itself.

The boat should be built upside-down for easiest construction. If this is done, and the floor is level, it may become your base line and greatly simplify the job. Set each frame up and shore it in position so that it cannot move. A cross piece should be nailed or screwed across each frame near the base line to prevent the frames from spreading. The frames are set up 2' 2½" apart and you will note that the frames No. 1 and No. 2 are on the forward side of the dimension while the frames No. 3 and No. 4 are on the after side of the station line. This is done to make it easier to bevel them.

The notches for the keel which have already been cut will not take this member. You will find that it has a lot of rocker or

bend in it and if you have too much trouble, soak it in water for a few hours to soften it up. Another way is to wrap it in old rags and pour boiling hot water on these. Perhaps the best and easiest way to do the job is to make the keel in two pieces, one on top of the other and glue them together with one of the waterproof glues that are now available. This means that you will only have to bend half the thickness of wood. The stem notches over the keel just aft of frame No. 1 and is bolted thereto with about ¾" galvanized iron bolts. These

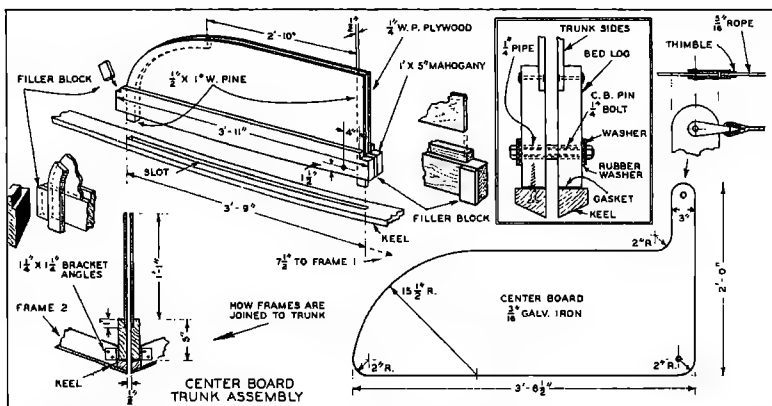
are countersunk on the outside of the keel. The stem may be made from one piece of wood such as oak or hackmatack or better yet, simply bandsawed out from a single piece of ¾" plywood.

The entire framework, stem, transom and frames must be securely fastened down so that none of it can give or move.

The next step is to cut the notches for the chine pieces having them beveled to follow the curvature that the chine piece itself will follow. The same holds true of the sheer stringer. Both these members come in and lap on the stem where they must be securely screwed. The outer surfaces of these members will have the same curve as the inside of your planking and you can use them as patterns to go by in beveling your frames, topsides and bottom. There will be considerable bevel up near the bow. The keel must be beveled to the same angles. Of course, the stem must be beveled in the same manner, as our plywood goes clean over everything without using any troublesome rabbet. A little time spent at this stage of the job will repay you well later, because everything will fit so much better.

The plywood, itself will go on easily. Use waterproof glue between the plywood and the surface next to it and then use enough screws to hold the plywood in place until the glue sets. If done properly, you can build a boat with about half the number of fasten-

Section drawing, right, of frame with materials, dimensioned half frames showing distances to base line and sheer, and side view of frame set-up. Step mast where indicated, with 5" rake. Place mast partner accordingly.



Centerboard and centerboard trunk construction details. Hull frame is cut at keel to accommodate bed logs. These are fastened to cut frame with brass angles.

ings usually used. This is another reason for having your frame surfaces all beveled properly. The plywood will lie up against it fair.

Put the sides on first and plane off the edges flush with the bottom edge of the chine piece. Cut carefully along the centerline also, so that the joint between the two bottom pieces will run down the exact center of the keel. The plywood will then go in place, but you will run into one thing up near the bow. The edge where it joins the topsides will require a gradual bevel cut so that by the time it reaches the stem itself, the two pieces will be butting directly against each other. This is the hardest job on the whole boat and will require time and patience to accomplish.

The centerboard trunk is pretty thoroughly covered in several of the drawings and should be made exactly as shown. The bed logs are shaped to fit the inside of the keel with their upper edges mortised out to take the plywood sides. The inside should be smooth. Where frame No. 2 butts up against the trunk, it will have to be cut away to the exact width of the bed logs and then joined back to them with small brass angles after the trunk is in place.

Cut the slot through the keel as shown and to the dimensions shown. The ends must be square and plumb or the trunk will leak forever after. The end pieces of the

trunk are a nice hard fit into the ends of the slot and being of soft white pine they will swell more than the harder keel and make a perfectly tight fit. The trunk may be completely assembled outside the boat and then put in place. There should be a canvas and white lead gasket between the trunk logs and the top of the keel. Be sure it is sitting down as tightly as possible and then drill up through

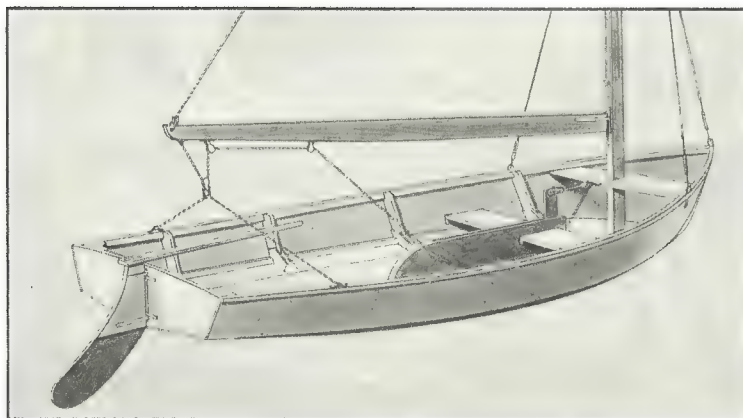
the keel for long galvanized iron screws. Place these about every 3" or 4" and set them up tight. They should be about 3" long.

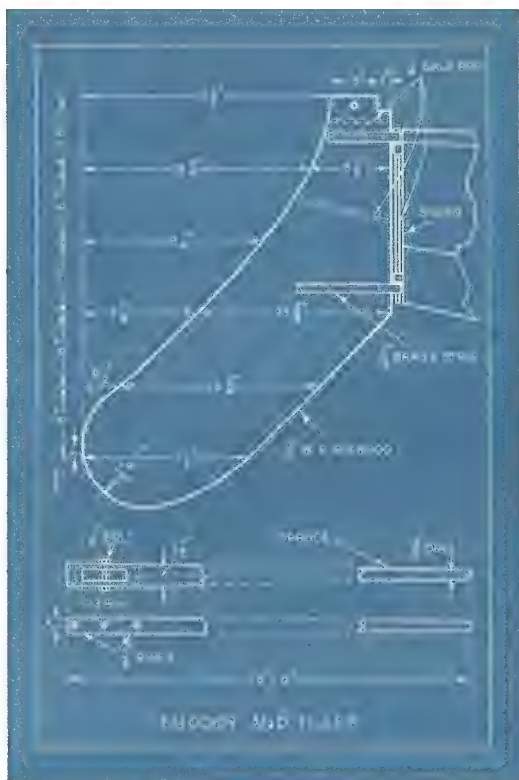
The centerboard should be cut out for you by the local boiler maker or junk yard. Be sure to have them drill the hole for the pin and also for the pennant up at the top of the lifting leg. The first hole should be about 1/2" in diameter and the upper one a little larger. The pin is assembled by using a 1/4" bolt inside a 1/4" pipe. Rubber gaskets on each side will allow you to set it up tight, but the pipe will hold it apart and prevent pulling the trunk together causing the board to jam.

The rig for the centerboard pennant is easily made but it must be kept narrow enough to prevent its jamming inside the trunk with the board down.

The rudder and tiller are simple. The rudder may be of 3/4" plywood or mahogany.

Appearance of completed hull with mast and boom in place. Chain plates screwed on through planking into frame No. 1. Moulding goes over them.





Dimensions and details of rudder. If plywood is used, galvanized rods through rudder are not necessary.

If made of the latter material it must have the $\frac{1}{4}$ " galvanized iron dowels as shown, to prevent splitting. These are not necessary with plywood. The pintles and gudgeons for the rudder may be made from scrap brass, and you will note that the straps on the rudder come above and below the gudgeons.

Thus, when you drop the quarter inch rod pin in place, the rudder cannot ride up without being stopped and it cannot drop off for the same reason. The rod holding it in place need simply be bent over at the top because it cannot get out unless you pull it out. The tiller should be made as shown particularly with the rivets as shown to prevent splitting.

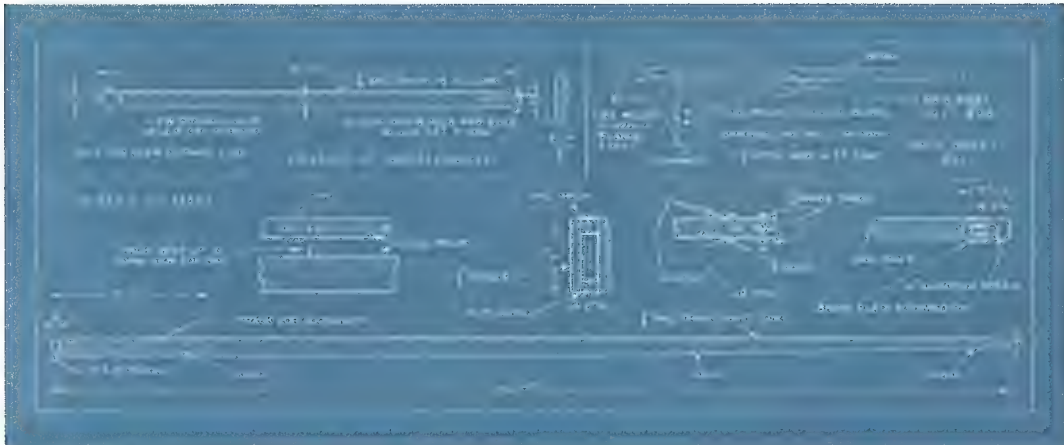
The mast is a simple tapered spruce box, built up on the floor in wood chocks with wood wedges to force it together and hold it until the glue has set. No fastenings are needed if the glue is properly applied. In fact it will be stronger and lighter without the fastenings. Note that the mast is hollow except at the bottom, at the tangs to hold the stays and at the top. Standard $\frac{5}{8}$ " sail track is used and a sliding gooseneck for the boom will be found to be a big help. The little pivoted piece of brass at the bottom of the sail track will be found to be a great help as it keeps the sail on the track at all times except when you want to take it off.

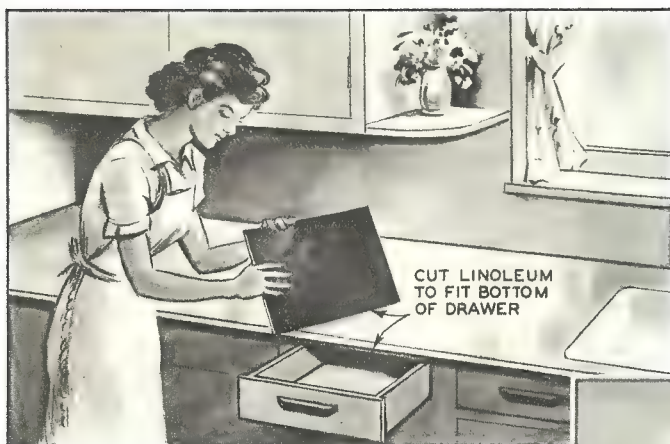
The drawing of the boom is self explanatory. It is a simple spruce board tapered a little and fitted up with sail track like the mast.

The various pieces of hardware are shown with catalog numbers.

There is a mast partner across the boat just forward of frame No. 1. It is important to get the mast and centerboard in the right spots if you expect the boat to sail properly. The foot of the mast should have a square tenon on it that will fit into a square mortise in a block of wood bolted down to the bottom of the stem. Be sure to include the thwart across the boat at the centerboard trunk; this is a strength member and is necessary.

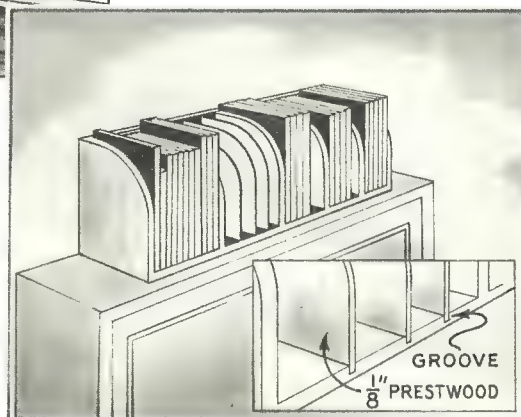
Mast, boom, and rigging details. Hollow mast has blocks in it at ends and at point where shrouds and jib stay are attached. Turn pivot at bottom of mast track to keep slides on sail from slipping off bottom.



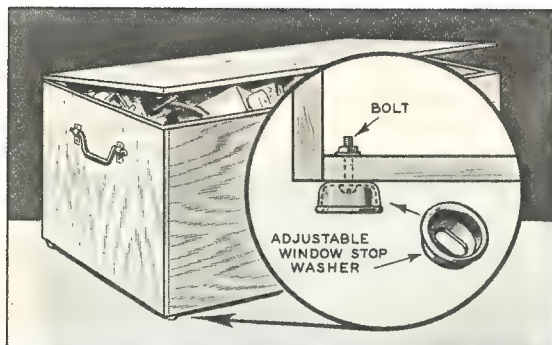


LINOLEUM DRAWER BOTTOMS are easily made from scraps of linoleum left over from a floor covering job, or from small pieces purchased at low cost from linoleum dealers. The linoleum is cut to fit the drawer bottom snugly. It eliminates the necessity of replacing drawer liners every so often. It is particularly useful in kitchen drawers, where other types of covering might be stained. Just wipe it clean.

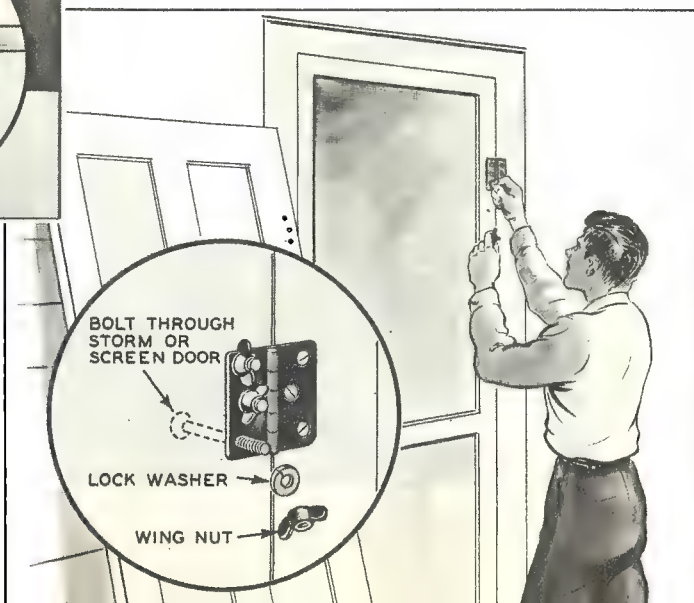
KEEP MAGAZINES UPRIGHT in the bookcase with the handy shelf rack shown at the right. The rack itself, is made from $\frac{1}{2}$ " or $\frac{3}{4}$ " lumber. Partitions of $\frac{1}{4}$ " plywood or $\frac{1}{8}$ " Presdwood are spaced at the desired intervals along the rack. Magazines may thus be removed from bookcase in groups.



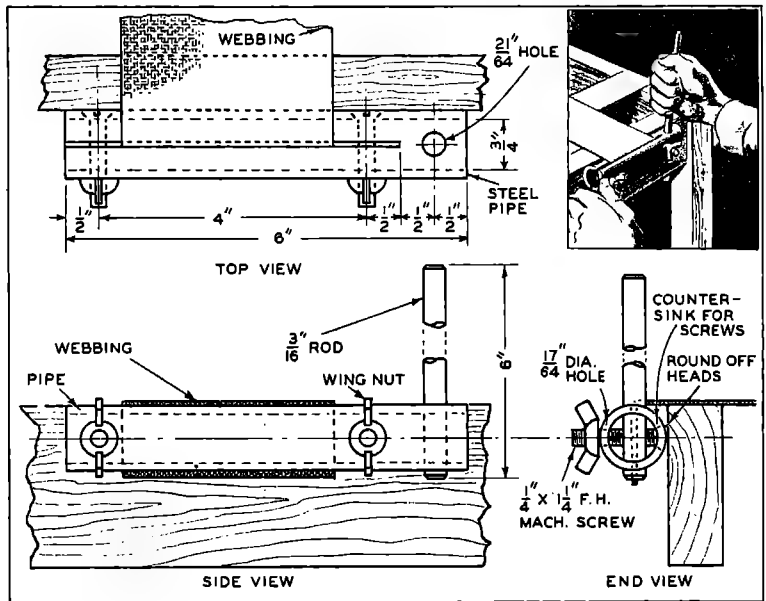
SCREEN DOOR HINGES and storm door hinges usually require larger screws each season, or a new position along the door. Avoid this nuisance of fastenings working loose, by leaving the hinges in place on the frame of the doorway. Use the same hinges for both the storm door and the screen door. Fasten the hinges to the doors with long bolts and wing nuts as shown in the drawing below. The hinges remain firm if this method is used.



GLIDER FEET for small articles of furniture can be made from adjustable window stop washers. The washers are easily fastened to the under side of the article with bolts. They are small and inexpensive, well suited to miniature items such as children's furniture.



A WEBBING STRETCHER for furniture can be readily made from a short piece of pipe and a few other common workshop materials, as shown in the drawing. It is a highly useful tool both in the building of new furniture and in the repair of old furniture. In the repair work, the working principle of this tool is particularly good. It permits the repairer to get a grip on very short ends of webbing, and then grip it firmly while tightening. Simply tightening the wing nuts that clamp the pipe slot edges together provides a firm grip on the webbing. The entire unit can then be pulled around by means of the $\frac{3}{16}$ " rod lever, using the edge of the furniture as a bearing

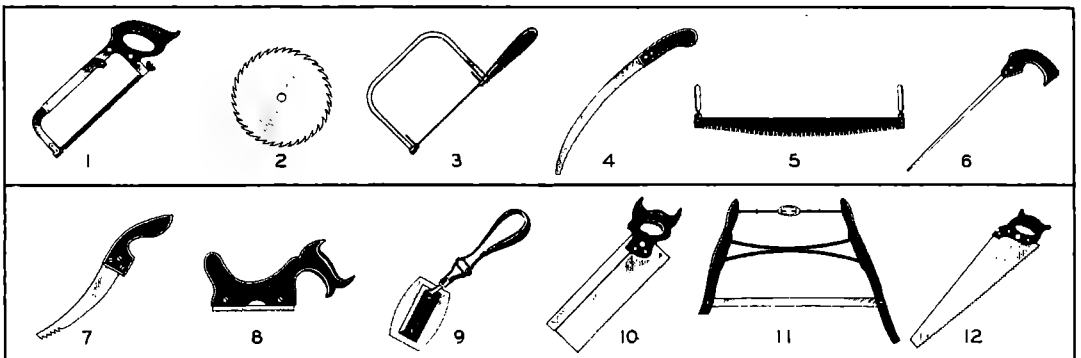


for the lever fulcrum. Cloth or heavy paper may be placed between tightener and furniture to protect the finish, although this upper part of the woodwork is usually covered.

TEST YOUR KNOWLEDGE OF SAWS

YOU are probably accustomed to using a wide variety of saws around your workshop, and you can probably do a good job with any one of them, but do you know what each

type is called? Look at the pictures of the saws below, write down the name you think is correct, then turn this page upside down and read the correct saw names below.



ANSWERS

1. HACK SAW (For cutting metal)
2. CIRCULAR SAW (Motor driven for general mill cutting)
3. COPING SAW (For cutting curves, scroll work, etc.)
4. PRUNING SAW (For trimming trees)
5. CROSS-CUT SAW (For two-man heavy duty work)
6. KEYHOLE SAW (For cutting frets and other fine work)
7. BEAD SAW (For scoring window frames, door frames, etc.)
8. STAIR BUILDER'S SAW (For making slots in stair treads)
9. VENEER SAW (For cutting veneer and inlay wood work)
10. BACK SAW (For fine joinery and cabinet work)
11. BUCK SAW (For sawing wood on a saw horse)
12. HAND SAW (For general work)

WOOD



Early model wooden bathing suit. Spruce veneer used in barrel stave fashion formed planking of this novel aquatic garment. Tested at Hoquiam, Washington.

THE sharp saw, which has written most of the history of wood, has gained a new ally in the test tubes of science.

Wood has built most of our homes, furnished them and warmed us by their firesides. Now, too, it serves as a raw material for paper, plastics, textiles and a wide variety of compositions.

Its historic tasks—chiefly as lumber—con-



Wool made from the bark of redwood trees in machines like the one above, is made into warm, serviceable coats such as the one shown in the top photo. Redwoods are famed for age and tremendous size.

**NOW YOU CAN EAT IT, DRINK IT OR WEAR IT—
SCIENCE MAKES ITS NEW USES ALMOST LIMITLESS**

by Leonard I. Lerner

tinue, but the advance in this and other fields continues. In heavy construction, the term "timber engineering" has newly entered the consciousness of architects and builders. Plywood flies in the air and sails the seas. Compressed woods do the work of metals. Pliable woods suggest hitherto unsuspected uses.

But this is only the beginning. Wood is chiefly cellulose and lignin. Chemists, who

have found many uses for cellulose and lignin, have yet to reveal all their secrets. Scientists like to work with wood not only because it is versatile, but also because it is a product of life and can serve us as long as life persists.

If wood is to continue as a material of construction and assume these new tasks too, Americans will want to know whether there is enough and whether there will continue to be enough. Here is explained how our forest lands can meet our requirements, assuring us that the "new age of wood" is not a dream but a growing reality.

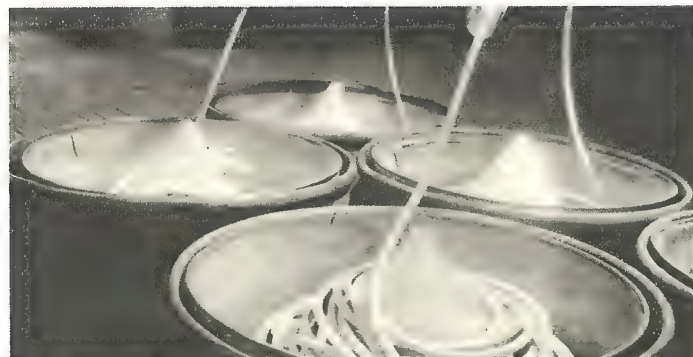
To begin with, we all know what a tree looks like, but few of us actually know what a tree can do for us. Our guns are being fired with powder made from nitrocellulose obtained from wood. And it's possible to eat wood and drink it. A wood "steak" made from protein yeast developed through the process of wood hydrolysis is common fare in Swedish restaurants. (While cooking, dry yeast smells like sirloin steak. Its chemical make-up is quite similar to that of meat.) And much of Sweden's famed Aquavit is made from alcohol obtained through the same process. Served in glasses resembling sherry glasses, 86 proof Aquavit is drunk like a cocktail. At the present time, a plant in Oregon is under construction which will produce industrial alcohol from Oregon's vast sawdust piles.

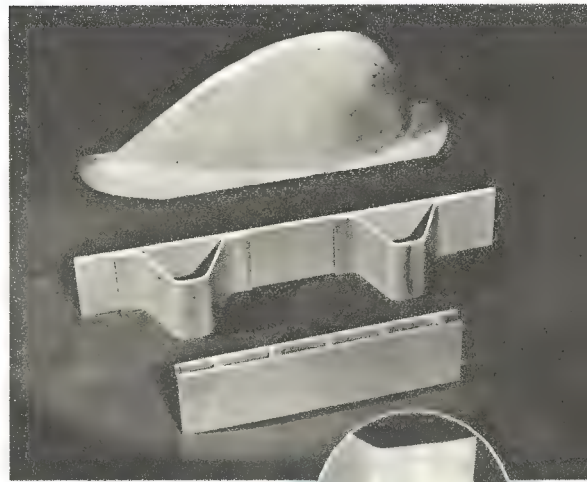
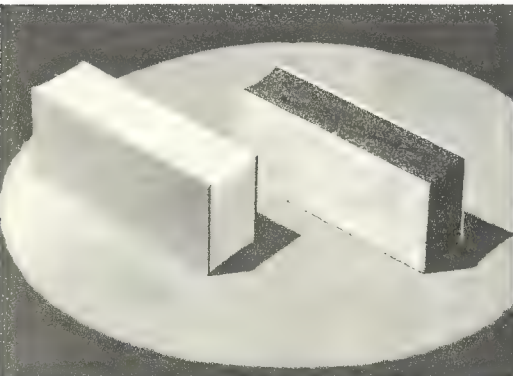
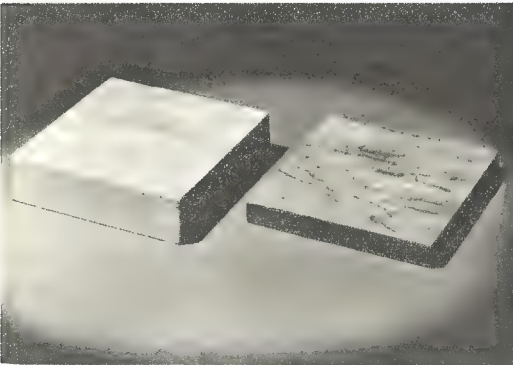
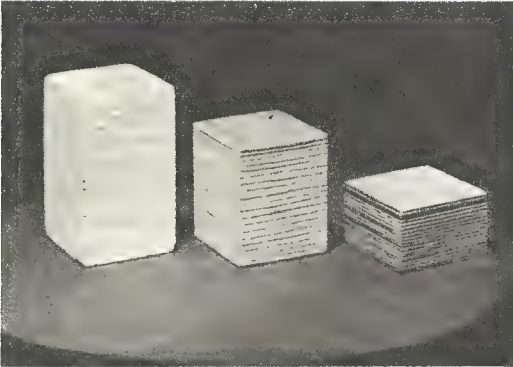
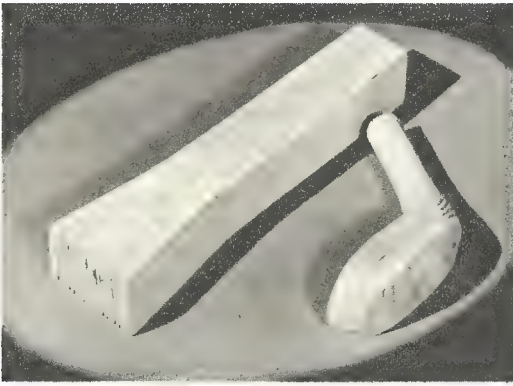
Most recent of the developments in the processing of wood, and a formula that will be employed in the post war period is the process known as "impregnation." Certain



Much wood pulp like that shown above, is made from Sitka spruce. The pulp is made into paper, and the sulphite liquor from the process makes yeast, alcohol.

Nitrocellulose from wood goes into manufacture of smokeless powder cords by Du Pont, at lower left. Aquavit, below, is made from pulp sulphite liquor.





Papreg, which consists of laminated paper impregnated with resins, is material in aircraft fairing and structural sections above. Circle, papreg laminae.

of the common faults of wood are overcome by impregnation, heat and pressure.

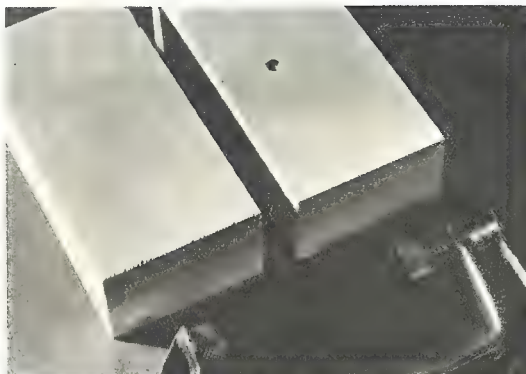
Stabilized wood, or wood that has undergone this process, is highly resistant to checking, warping and shrinking, and is stabilized against springing back to its former shape.

A description of the new names, forms and uses of wood is now in order. First on the list, we have Plywood, which consists of a combination of three or more sheets of veneer, with the grain of alternate plies usually at right angles.

Because plywood can be made with any desired number of plies from veneer of any desired thickness, it presents a versatility that affords almost unlimited choice in design for special purposes such as aircraft construction.

As compared with solid wood, the chief advantages of plywood are in equalization of strength properties along the length and width of the panel, greater resistance to checking and splitting, and less change in dimensions with changes in moisture content. The greater the number of plies for a given thickness, the more nearly equal are the strength properties in the two directions of

Top left photo, laminated wood section with laminae spread at end. Plywood golf club head. "Compreg," second photo from top, is resin-impregnated wood layer product. Left, untreated, center, 250 lbs., right, 1,000 lbs. pressure. Second from bottom, "Staypak," wood toughened by compression. Bottom, Sandwich materials, Papreg, etc., by U. S. Forest Products Lab.



C-clamp made deep indentation in untreated wood block at right, shallow one in Du Pont "Arboneed" treated wood, left. Dimethylolurea, urea are used.

Plywood's versatility permits fabrication into complex forms, as above. Known most widely in its panel form, it also finds wide application in moulded form.

the panel and the greater is the resistance to splitting.

Next on the list are the laminated woods. Laminated construction refers to two or more layers of wood glued together with the grains of all layers approximately parallel. The laminations may vary as to species, number, size, shape and thickness. The properties of laminated members are essentially the same as those of solid wood, but laminated members, if well constructed, are usually more uniform in strength properties and less apt to change shape with variations on moisture content.

A recent development in timber structures is the use of laminated members made in straight or curved form by bonding seasoned and properly surfaced boards with a water-resistant glue. A principal application is the construction of roof arches which have greater strength and efficiency and better appearance than were previously possible. Glued, laminated wood members have been used in hundreds of structures, including gymnasiums, community buildings, churches, theaters and clubhouses, and their use is expected to grow as possibilities of this form of construction become more widely known.

It is, of course, obvious that in addition to the use of wood species and modified wood and fiber products, there are practically unlimited possibilities of combining these materials in various forms of composite or "sandwich" construction. In "sandwich" construction, the properties of each material can be used to best advantage, employing where desirable materials of higher density and strength for exterior surfaces where they are most effective in increasing the moment of inertia, as well as in adding to the strength and stiffness of the section.

Already well-known is the success attained by this technique in the mosquito bomber, in which plywood faces are glued to a low-density balsa wood core, to afford a light weight construction of considerable thickness and of relatively high strength.

Resin-impregnated wood, laminated paper plastic, and many other materials likewise hold promise for innumerable applications in "sandwich" construction.

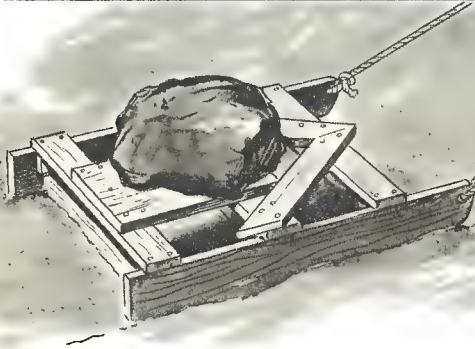
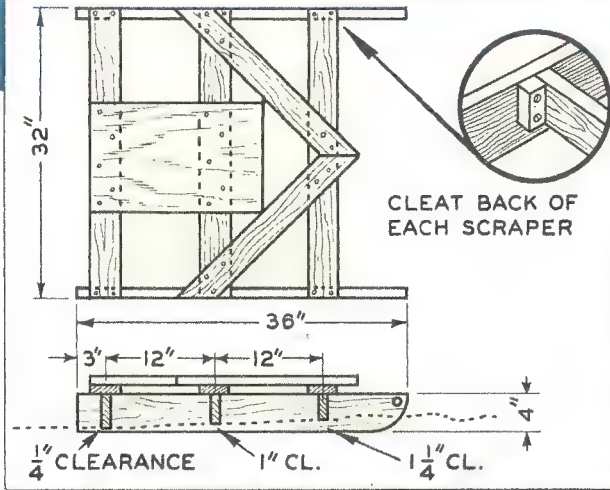
Perhaps no single factor has been more responsible for the significant advance in the field of modern wood construction than the development in glues and gluing technique. The past decade has brought synthetic resins that have greatly widened the horizon for fabricated products that must resist continued exposure to moisture changes.

The forms, characteristics, and properties of water-resistant casein glues have remained substantially the same for many years. The dried casein of milk is the basic constituent of this class of glues. It is combined with alkalies of alkali-producing chemicals which, when mixed with water, dissolve the casein. The addition of lime or other materials causes the glue to set and later retain a part of its strength, even when saturated with water. Toxic materials are frequently added to make the set glue more resistant to molds and other deteriorating organisms.

All the new developments in wood are fine but it must be remembered that wood is still wood, and as such can burn. Fireproofing is another development that must be added.

Fire resistance can be imparted to wood by impregnating it with substantial quantities of suitable chemicals, notably the phosphates of ammonia, or mixtures of ammonium phosphate, ammonium sulfate, borax, and boric acid.

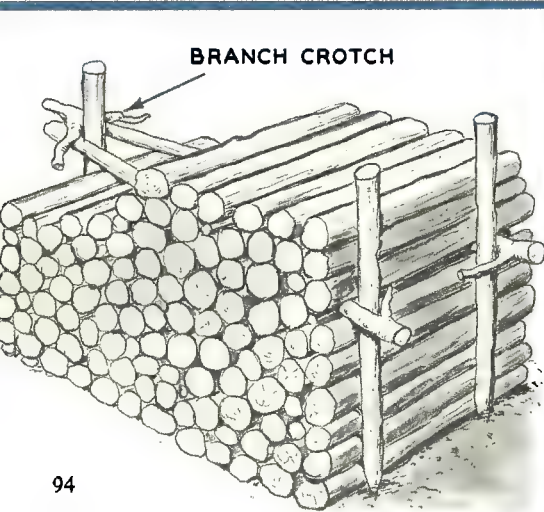
[Continued on page 140]



THIS GRADING SLED can easily be built from a small amount of scrap lumber. The three scrapers are of progressively less clearance, starting at $1\frac{1}{4}$ " at the front, and graduating to only $\frac{1}{4}$ " at the rear. With this arrangement an exceptionally smooth garden plot grading job can be done. A sand bag or stone is carried on the platform as ballast.



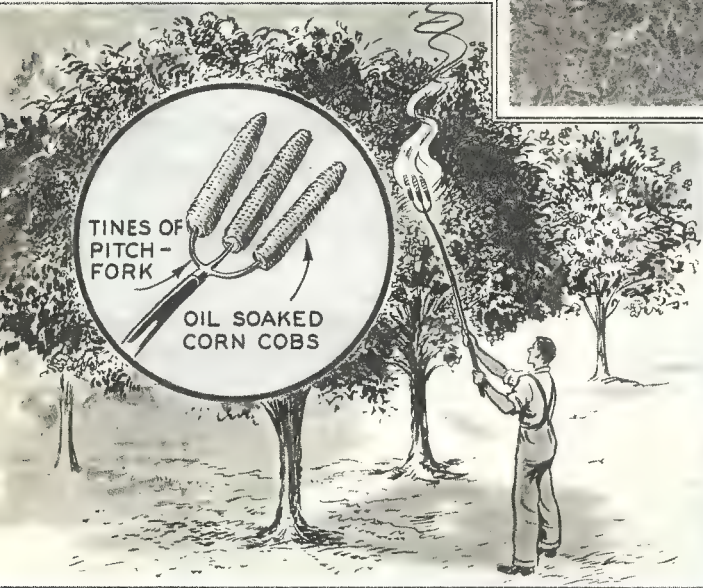
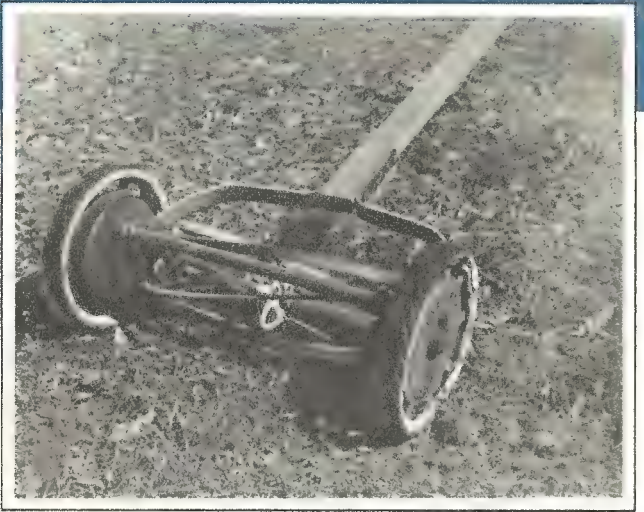
MEDICINE DROPPERS make the even distribution of small seeds an easy matter. Remove the rubber top of the medicine dropper, fill the glass portion with the seeds, replace bulb, and squeeze it to dispense seeds.



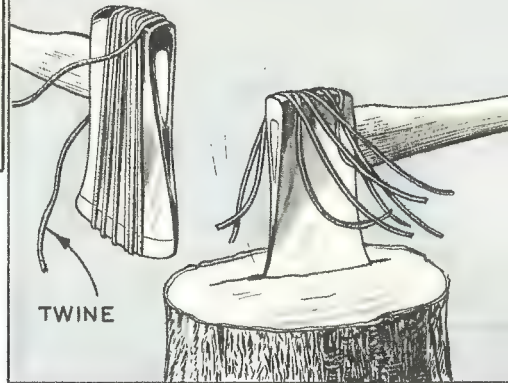
STACK CORDWOOD to conform to cord measurements, by using crotched saplings or branches, cut to the proper length and used as shown. This method of stacking produces a wood pile that remains in shape as logs are removed. It is an easy matter to judge the amount of fire wood on hand when you use this system, and logs can't roll off.

IDEAS

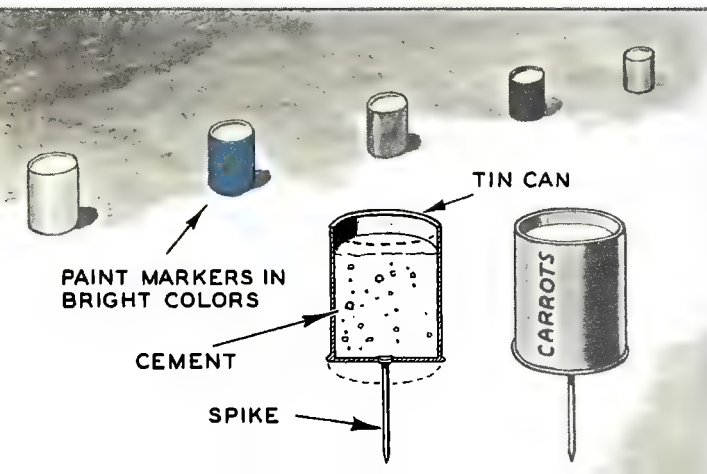
MAKE TIRES for your old metal-wheeled lawn mower, from old bike tires. Cut the tires to the proper length to go around the lawn mower wheel, and sew the ends together with wire through the tire walls. The wire should be carried through the spokes.



OIL SOAKED CORN COBS impaled on the tines of an old pitchfork, and ignited, serve as effective torches for destroying tree moths and caterpillars. It is easy to reach the branches, and the corn cob wicks cost practically nothing. Don't use a new fork.



MAKE SACK TIES OF EQUAL LENGTH by wrapping twine around an axe as shown, and driving the axe blade into a block of wood to cut the twine. The ties that are cut in this manner are all the same length, and are not as likely to fray as when cut with a knife. Tie twine ends to the axe before cutting.



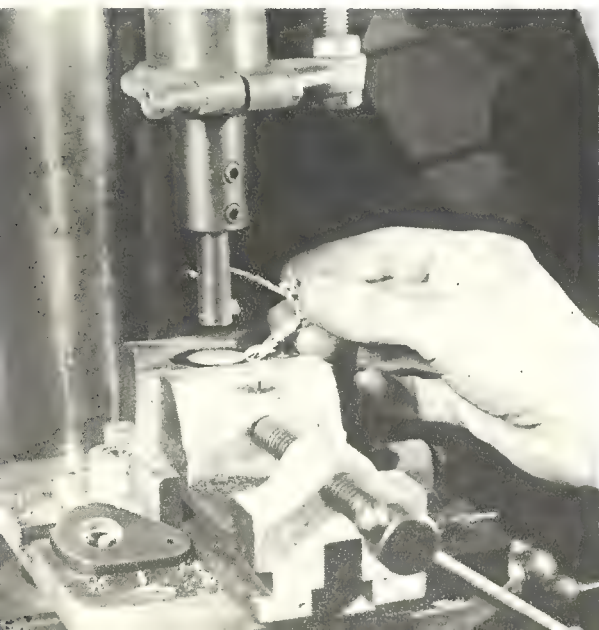
PATH MARKERS of an inexpensive but durable type can be made from tin cans filled with cement. A 6" spike is driven down through the bottom of the can. The head of the spike should be left a little above the can bottom so that the cement will hold it firmly when hard. The outside of the cans may be painted in bright colors or plain white. For row markers in garden, stencil vegetable names on.



Hand coping saw is used to cut original lens mount from $\frac{1}{4}$ " thick Formica scrap held by clamp in vise.

Packet Magnifier

ALMOST everyone can find a use for a folding pocket magnifier that has one, two, or three lenses. The model shown was assembled from scraps of $\frac{1}{4}$ " Formica paneling, some Monel metal 0.030" thick, a brass bolt, and three positive (magnifying) lenses. It weighs $2\frac{1}{4}$ oz., and has a maximum magnification of about 24 diameters.



Clamped together by bolts, and held in vise, lens mounts are filed carefully so that all match in shape.

This magnifier is an interesting project and a useful aid in inspection of small parts.

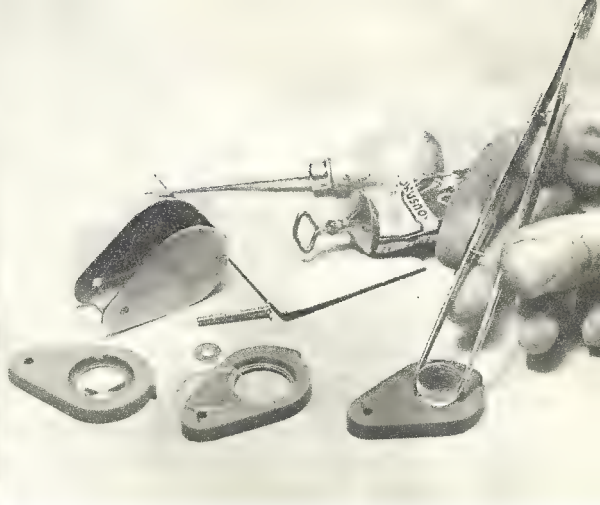
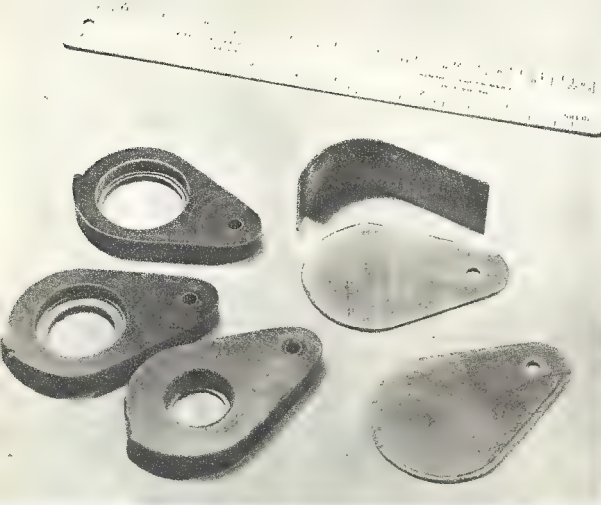
by Walter E. Burton

First of all, select the lenses you wish to mount in the instrument. If you have a wide choice, use one lens of fairly long focus, say 75 to 100 mm., another of very short focus, say 20 to 25 mm., and a third lens somewhere in between. Or you can mount two or more lenses of the same focal length, but preferably not more than 50 mm., together, for when you look through both of them they act as a single lens of shorter focus, and consequently produce greater magnification than either lens alone.

The diameter of the largest lens will determine the size of the mounts in which they are held. For compactness, this lens diameter should not be much more than 1" in most cases. For the mounts, you can use a material like Formica, Bakelite, Presdwood, or any of a number of plastics; or a metal such as aluminum or brass. The thickness should be sufficient to permit the thickest lens to be mounted without the surface projecting above that of the material. In the magnifier shown, the folding mounts are $\frac{1}{4}$ " thick. Lay out the mount pattern as illustrated by the drawing, allowing at least $\frac{3}{16}$ " all around the lens if a plastic or similar material is used; less if you employ metal. Use the pattern to mark out the mount blanks. On one blank, punch-mark the center of the lens hole and of the hole through which the hinge pin will

Mounts are bored to slightly larger diameter than lenses, with fly cutter boring tool. Rim is left on.

Mechanix Illustrated



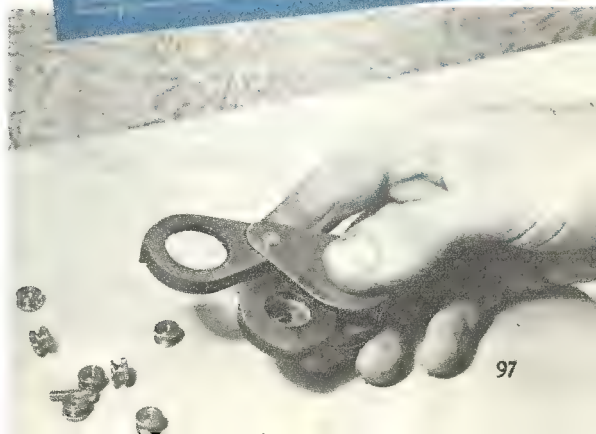
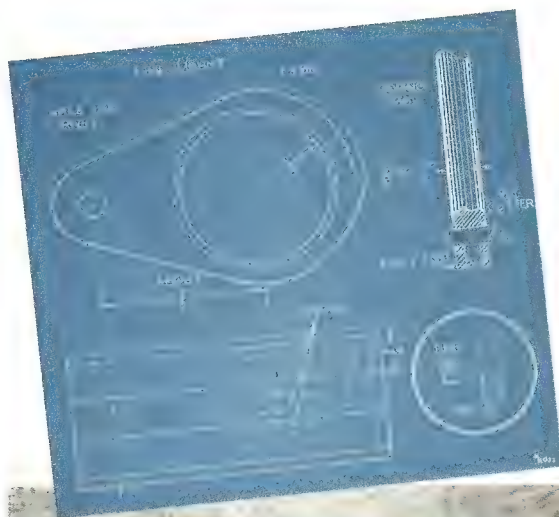
Magnifier parts. Three metal parts at right are soldered to form case. Edge nibs on mounts aid opening.

Coat perimeter of lens mount hole with cement, set lens snug against rim left when boring. Case at left.

extend. You can saw the blanks approximately to shape with a hand or scroll saw, power jig saw, or any other suitable tool. Place the pieces together like a sandwich, the punch-marked one on top, and with a No. 28 bit, drill two holes through the stack. Insert 6/32" bolts and use washers and nuts to clamp the blanks together. Now when you bring them to final shape with a file or abrasive belt, and polish them with fine abrasive or a buffing wheel, all the lens mounts will be the same size. It is a good idea, however, to mark their relative positions with lacquer or something else that can be removed subsequently, for they may not match perfectly enough to be interchangeable, unless you are extremely accurate in your filing.

Next make the lens holes. Each hole is slightly smaller in diameter than the lens it is to receive, and is counterbored for the required depth to a diameter slightly larger than that of the lens. One way is to clamp each blank in an independent-jaw chuck and do the work on a lathe. Another is to employ a drill press as follows: Make a boring bar (if you don't already own one) having a fly cutter, as shown in construction photo. The diameter may be $\frac{3}{8}$ ", $\frac{1}{2}$ ", or any other convenient size. The cutter is a piece of lathe bit or broken twist drill held in a cross hole by a setscrew and ground so it will throw up a clean chip when revolved against the blank. The shank should project at least $\frac{1}{8}$ " beyond the cutter to form a pilot. Center the lens-mount blank in the drillpress vise, enlarge the No. 28 hole to the diameter of

the pilot end of the boring bar, and then use the bar to bore out the *largest* diameter of the lens hole. Note that this diameter extends only part way through the mount. Use a hand reamer to enlarge the pilot hole to a diameter slightly less than that of the lens: you could do this with the boring bar, but it is likely to grab when the cutter breaks through and the [Continued on page 134]



Completed magnifier is compact. Nibs on lens mounts seat on case back. One or more lenses can be opened. Diagram shows magnifier and fly cutter boring tool.

Skate Wheel Trailer Truck

THIS rugged little toy fills the primary requirements of all good toys. It is realistic and operates in a realistic way.

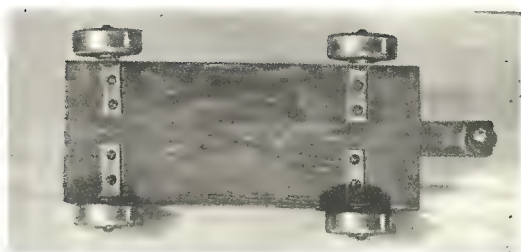
by Harold Gluck

An old pair of roller skates and a few scraps of wood are about all that go into its construction, aside from a few wood screws and the angle irons that carry the wheels on the trailer unit. The trailer wheels are held to the angle irons by bolts. The nuts should be on the inside, as the rounded heads of the bolts make neater looking hubs for the roller skate wheels. The roller skate wheels can be drawn up tight against the wooden chassis of the truck tractor in front and against the angle irons of the trailer, as the center bushings of the wheels do not turn. The wheels turn around them on ball bearings.

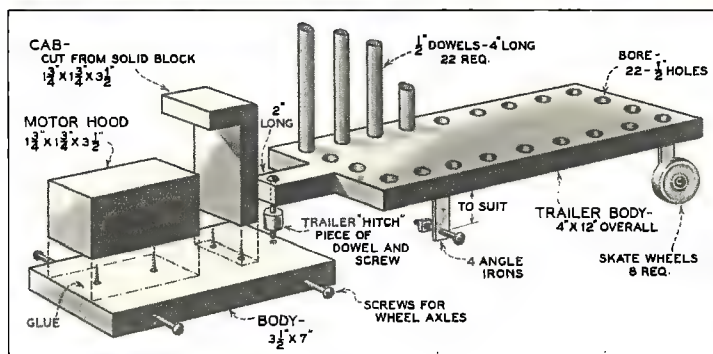
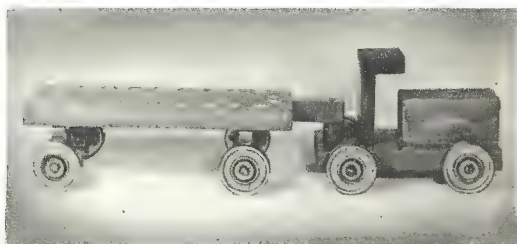
Colored dowels are used as the sides of the trailer. The child can remove any or all of these uprights simply by pulling them out of the holes. With a few left standing, the others may be carried by the little trailer truck as cargo. The trailer can be unhitched from the truck tractor by merely lifting the front end to disengage the coupling.



Hours of fun are in store for the youngster with this easy-rolling toy trailer truck on ball bearings.



Underside of trailer. Angle irons carrying wheels must be carefully lined up so trailer runs straight.



In photo above, all uprights are in place on trailer. Truck tractor is uncoupled. At left above, tractor and trailer are connected, and uprights are removed to haul bulky play cargo.

Flat chassis of truck tractor and trailer are shelving scraps or similar 1" or 3/4" stock. Nominal 2" x 2" stock is used for motor hood and cab of truck tractor.

A REMINDER OF— Model Jet Plane Contest!

Announced in the April issue of MECHANIX ILLUSTRATED

THREE BIG PRIZES — FIRST PRIZE: \$200; SECOND PRIZE: \$100; THIRD PRIZE: \$50

HERE ARE THE SIMPLE RULES:

1. Contest is open to all MI readers. Fawcett employees and their families are not eligible.
2. Closing date of contest will be midnight, July 31, 1945. Entries must be postmarked not later than that date to be eligible.
3. Judges will be MI editors. Their decisions will be final. In case of a tie, duplicate prizes will be awarded.
4. You do not need to submit your model to enter the contest; simply send photo or photos of the plane and engine which you have built and tested plus a letter of description. Preliminary judging will be made on the basis of photos and description. Finalists will be required to submit their models for testing and inspection. **ALL MATERIAL SUBMITTED, INCLUDING PHOTOGRAPHS, MODELS AND LETTERS, WILL BE HANDLED WITH CARE AND RETURNED POSTPAID.**
5. Models are limited to 5-ft. wing span, but there is no limitation on originality of design. It is definitely required, however, that the model be propelled by a jet type engine or mechanism; i. e., by the expulsion of propelling gases from rear of power plant.
6. Entries will be judged on the basis of efficiency of design and performance.
7. Address entries to Model Editor, Mechanix Illustrated, 1501 Broadway, New York 18, N. Y.

The jet-propelled Bell P-59 Airacomet.



Here's the contest you serious modelers have been waiting for! Jet propulsion is the latest thing in aviation, and there isn't any reason why you can't apply its simple principals to your miniature planes. MI is giving you the opportunity to have some fun and win a valuable cash prize, too. To help you get started, an instructive article on model jet engines was included in April MI, copies of which are still available.

Folding Tea Tray

by Charles and Bertram Brownold

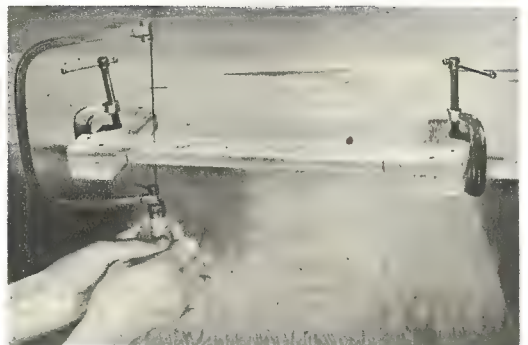


Fig. 1 above, illustrates process of pegging cross-piece to rack legs. In Fig. 2 below, rack legs are being sanded. Broom handle section goes through holes.



This handy and attractive tea tray is easily made from a minimum of material.

THIS tea tray is very simply constructed and easy to make, and has a wide number of uses. It is ideally suited to the serving of a light lunch or odd-moment snack, as the tray can be set in the kitchen and then carried in the rack without the necessity for setting a table. The tray is 18" from the floor which is about the height of a coffee or cock-



Scalloped end piece is being cut in Fig. 3 above. Clamping arrangement shown is simple and firm, and facilitates easy cutting of smooth curves outlined.

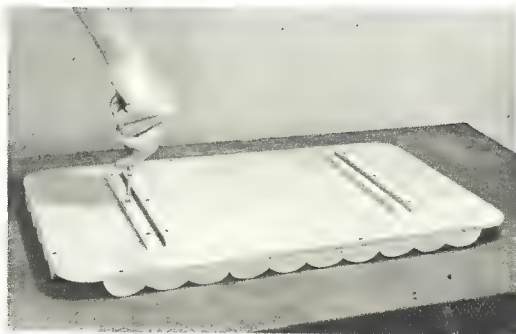


Fig. 4. Screwing cleats to underside of tray. Make certain the two sets of cleats are parallel so the crosspieces will seat easily without twisting legs.



Fig. 5. Sanding completed tray. Care must be taken to get a smooth finish on scalloped edges of tray rails. All sharp corners should be rounded slightly.

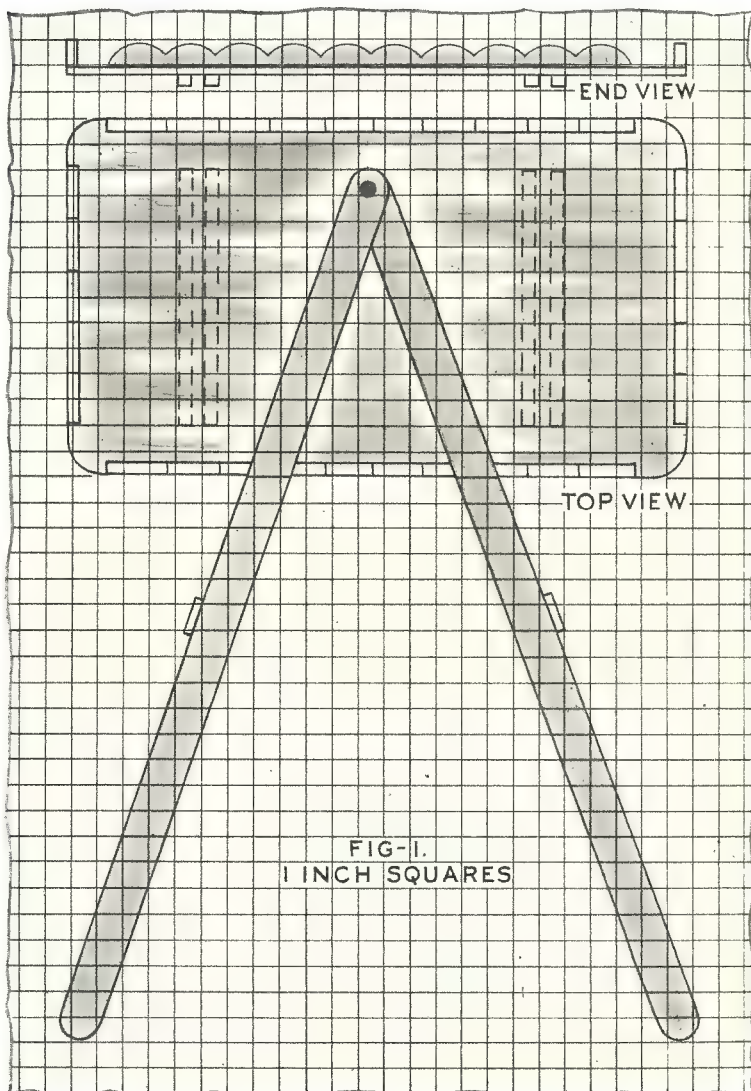
tail table. It is nicely balanced and light, and it is conveniently portable by means of the horizontal bar, and small enough to pass easily through doorways.

When not in use it folds flat, the tray nesting between the two members of the rack. When so folded it is easy to store in a closet, behind a door, or hanging on a hook. If used as a permanently set up piece of furniture it makes an attractive end table or smokers' stand.

In making the tea tray only hand tools are needed and only a small amount of material is required, all of it inexpensive. The four legs of the rack are identical. Dimensions are given in the drawing. While you need not adhere rigidly to the dimensions given, it is not advisable to change them too greatly as the size of the original model illustrated has been carefully worked out and found to be ideal for general use.

A strut, or crosspiece, joins the two legs of each member of the rack, being pegged and glued in place as shown in Fig. 1. Later they are cut flush and sanded smooth.

A piece of broomstick
[Continued on page 132]



Squared drawing of tea tray and rack. Dimensions permit entire unit to be carried assembled through doorways. The four rack legs are identical.



THE SCHOOL SHOP

Conducted by Gilbert Paust

Training Officer, N. Y. Group No. 9, Civil Air Patrol

Chapter 26—Forced Landings



Landings can be made on any convenient roadway free from trees. Army liaison pilots are skilled in this.

THE scene is a local airport.

It is mid-morning, and the air traffic, both light planes and commercial craft, are waiting their turns to take off at the bottom of the runway.

A small two-seater wheels out to the end of the strip, and its pilot opens the throttle which sends the tiny plane racing over the field. In a few hundred feet it leaves the ground and begins to climb.

Suddenly, something happens! You have watched any number of planes take off from this airport to roar in the sky above. You have become quite accustomed to hearing the sound of their motors, loud at first and then diminishing to a soft drone as they disappeared in the distance.

But this time it is different. The steady sound of the engine is interrupted by a sputter, a backfire, and finally only an ominous

stillness remains. Immediately the airport is aroused to activity.

Hangar and office doors open, and mechanics, passengers and spectators run out to the field. They too, have recognized the meaning of the sudden interruption of sound. The crash car drives out on the field in readiness.

The plane has reached an altitude of about 100 feet before its engine died; straight ahead lies the airport boundary, marked by a line of trees. Beyond this is a narrow roadway, and then a large orchard. It just clears the boundary and heads for one of the largest trees in the orchard. Slowly, the plane's nose rises to landing position as it approaches the tree, and then, in perfect three-point position, it settles into the branches. Damage is slight, and the occupants of the ship are unhurt.

When "coming in" too high or when the field is small, a side or forward slip is an easy way to decrease altitude without picking up speed.



This pilot knows his stuff. He has executed a perfect forced landing in safety.

The aircraft engine is the pilot's friend. If he treats it with respect and does not abuse it by running with a low oil supply, operating at maximum r.p.m. for more than 1 minute, blasting it with the throttle, etc., it will serve him faithfully and well. The C.A.A. furnishes a list of engine features which should be checked every day before take-off; if these are followed, the chance of engine failure in flight will be slight. Dual ignition, now installed on all aircraft engines, has eliminated difficulties as far as this item is concerned. In addition, each system must be checked just before take-off. The required 100-hour inspection is a double-check on the engine's airworthiness.

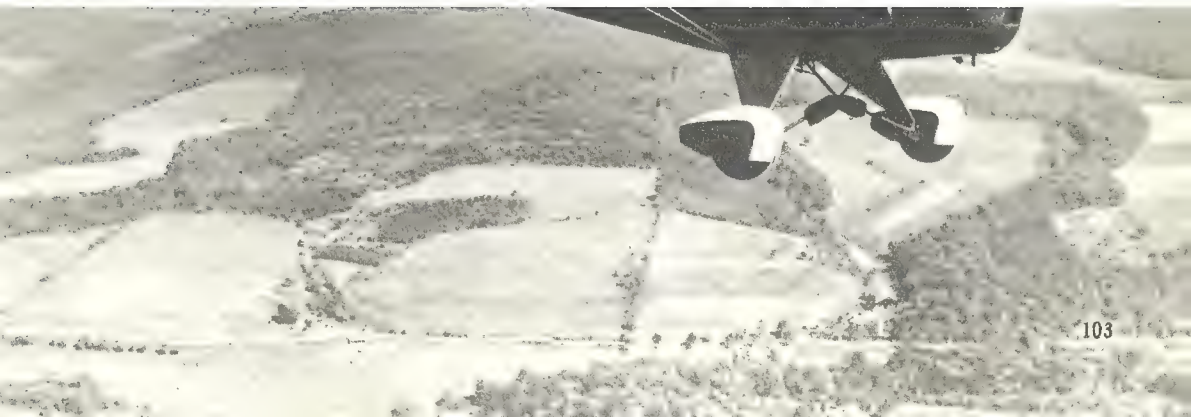
Nevertheless, a forced landing may sometime confront the most careful pilot. If he uses good judgment, it can mean little more than a delay in his planned trip. The most serious consequence of a forced landing usually is the fact that the plane is brought down in an area too small to permit take-off, in which event it must be disassembled, transported to a take-off spot of sufficient size, and

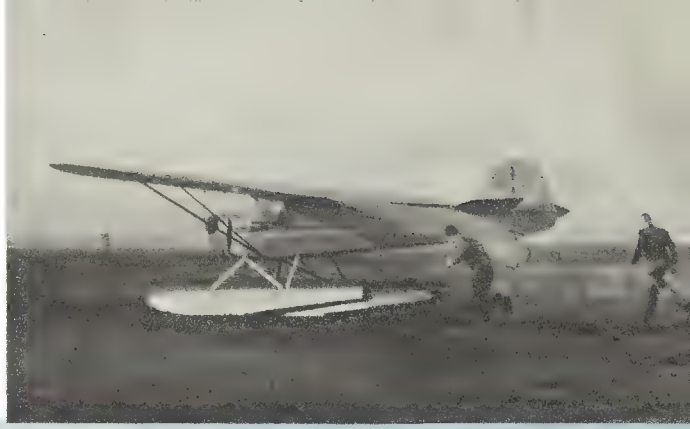
reassembled. Complete engine failure is not the only cause of a forced landing, however. One can be caused by only partial engine failure, weather below the ceiling and visibility minimums, or by some structural failure, this last becoming increasingly rare.

One of the most serious types is the one described at the beginning of this article; engine failure on take-off. On first consideration the reader might say, "Why didn't the pilot turn around and land back on the field instead of gliding straight ahead to land in the tree?" And this is the first reaction of the novice when he meets just such a situation. He attempts a turn at the low altitude, one wing dips and the plane, traveling very slowly, slows up still more, stalls, and crashes to the field. The rule is: when engine failure occurs during take-off and your altitude is less than 200 feet, **LAND STRAIGHT AHEAD**. Minor variations from a straight course are permissible to avoid obstacles.

A tree with dense foliage and many branches will make a safe perch for your plane. Adjust your glide so that your plane

Always keep an eye open for good spots where you can set 'er down in the event that your engine decides to quit.





The pilot of the plane at left parked in a clump of trees when his engine failed. He was uninjured, but had quite a climb to the ground. Seaplanes on floats can be landed on grassy fields and taken off from them in emergency (above).

will reach a complete stalling attitude (with tail way down as in landing on a field) when the tree is reached. When necessary to land on a small field or pasture and you find that there isn't enough room to avoid a stone wall, ditch or obstruction at the far end, head for a tree or a pair of trees close together. In the former case, come in close to the ground and strike the tree with one wing. The wing will shear off and the plane will swing around, but it will lose its momentum and the fuselage will remain undamaged. In the latter case, flying at a low altitude between the trees will shear off both wings and leave the fuselage undamaged.

Remember that the scenery might not be so enjoyable from a high altitude, but generally, the higher you are the safer you are. From a high altitude, a wider expanse of landscape is visible, and gliding distance is increased. You have time to check your map to see whether or not you can make the closest landing area. Altitude is especially important when flying over mountainous or rough terrain and long glides are necessary. A good pilot flying cross-country will unconsciously keep a lookout for an emergency field which he can use if necessary: that open dirt road or highway, clear golf course or broad pasture. He

bears in mind continually the wind direction, so that he can "come in" into the wind.

In his landing, he spirals downward over his chosen spot, watching carefully for shadows which reveal the presence of rocks, hummocks or hollows. Having negotiated his approach into the wind, he "slips" down to the near edge of the field and "sits down."

The slip is a maneuver for losing altitude quickly without picking up excess speed. There are two types; the forward slip and the side slip. The forward slip is accomplished by lowering the nose, banking with the ailerons and then kicking opposite rudder. This causes the wing to drop and the plane's nose to swing in the opposite direction. The plane glides downward almost sideways, but there is no danger of stalling since the lowered nose insures stability. The side slip is accomplished by lowering the nose slightly and banking, the plane sliding downward sideways in the direction of the low wing. In both of [Continued on page 136]

After he has chosen his spot, the pilot making a forced landing spirals to the field, landing into the wind and slipping to lose altitude if he's too high.



PLANE QUIZ

Can you identify these German planes? Answers are on page 140.



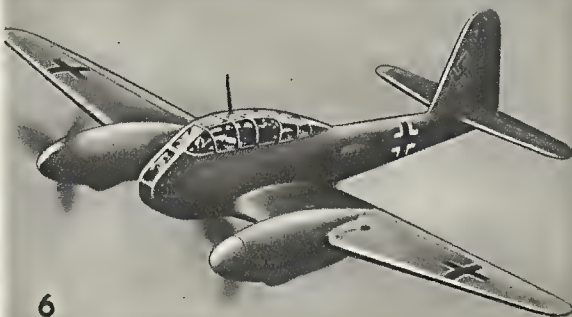
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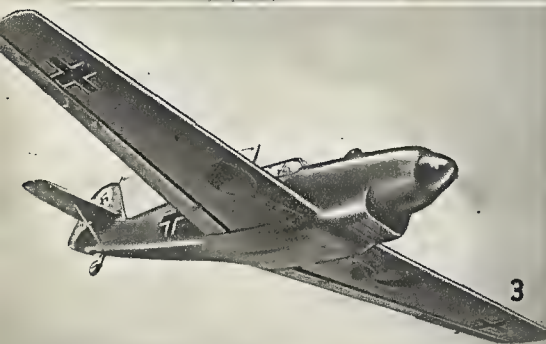
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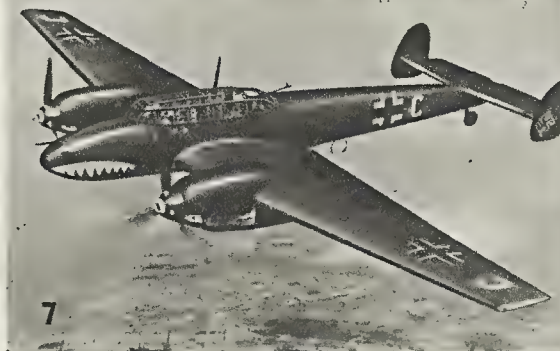
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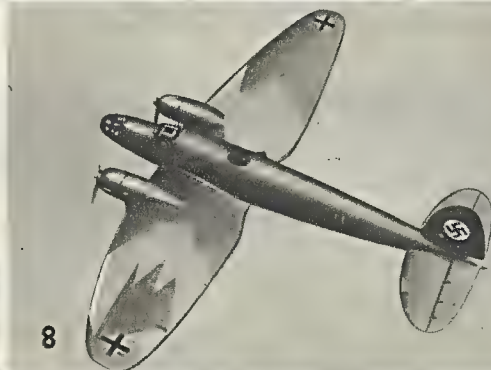
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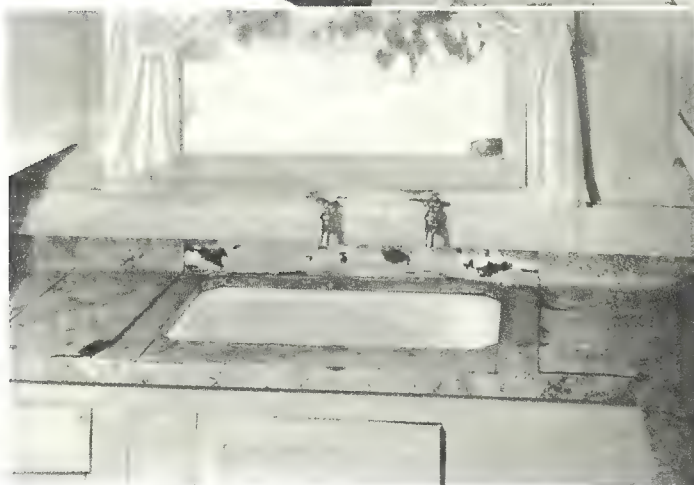


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8

Dressing Up Old Drainboards

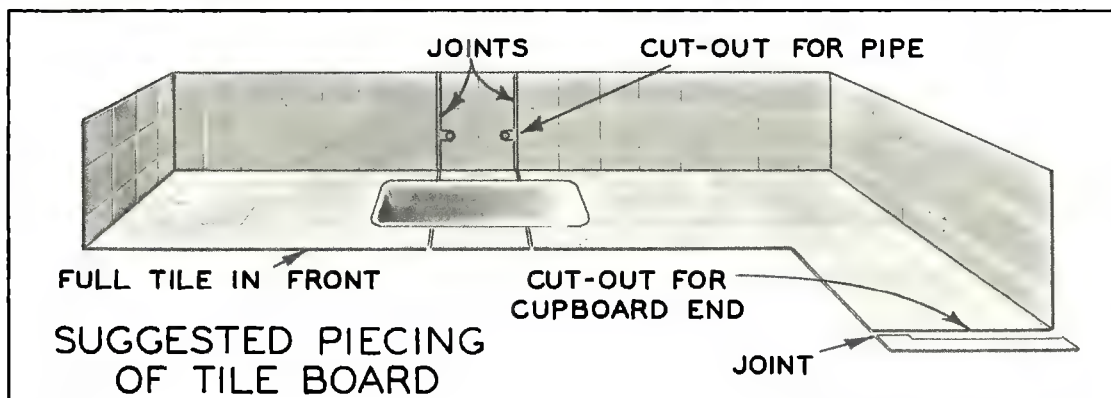


by Edwin M. Love

Put beauty in your old
kitchen sink with some
modern tile board.

Shabby and unsightly old sinks and drainboards such as shown at left may be put in shipshape condition like the above photo. It doesn't look it, but it's the same sink with squared tile board.

Tile board may be used on walls around sink and drainboard as well as on horizontal surfaces. Joints where board is pieced are hidden when job's done.



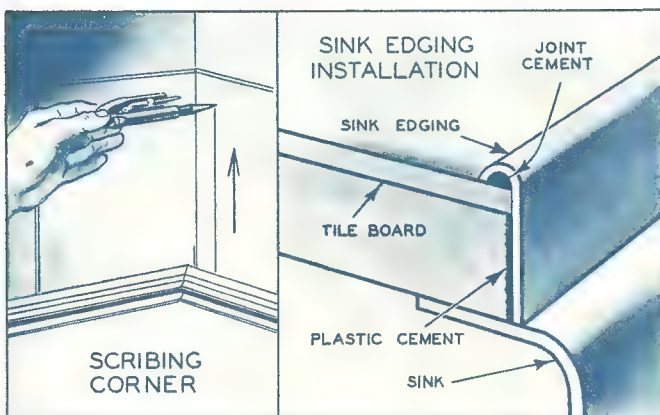
BATTERED wooden drainboards or peeling linoleum counters are featured by many houses rented to defense workers. Hired labor for repairs is not to be had, but a resourceful husband can install a tileboard drainboard and bargain with the landlord to take the cost out of the rent.

Tile board, which is Masonite finished in colors and struck off into 6" squares with recessed white lines, is made in sheets 2'x4' or 4'x4', while plastic corner mold and sink edging can be purchased at furniture stores as well as lumber yards.

Preparation for the tile board lies in cleaning away old linoleum or finish, as well as all unsound cement remaining on the rough boards. If a wooden drainboard is to be replaced cut it up and nail it crosswise of the cabinet tops, leveling the sheathing or sloping it slightly toward the sink by means of tapered shims under the ends. The sink, if installed sloping toward the drain, should not be changed. Pry out corner blocks above the sink rim, and thoroughly clean the joint between the wood and rim, packing it with tile-board cement or mastic.

Miter the corner mold joints, fitting the pieces along the vertical walls. Vertical corners may be made without molding, the butted joints being scribed for a good fit and caulked with white joint cement. Cemented joints are also best between pieces on the same wall or counter.

A quart of tile-board cement is sufficient for a small drainboard and counter. Apply it to the wall with a paddle and spread with a plywood comb. Run a ribbon of mastic or plastic cement in the molding grooves to keep out water, insert the edge of a wall piece, and push it endwise toward the corner to establish suction with the cement. As there is room in the molding groove for "give-and-take" the upper edge can be pushed up against the existing cap or even into its back rabbet.

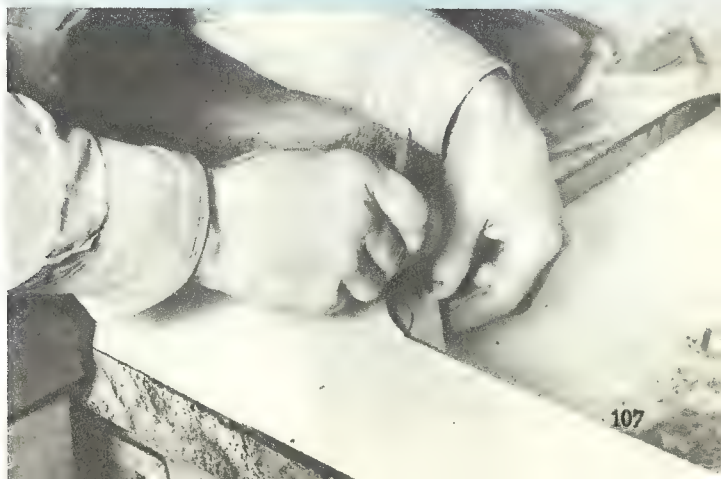


Cross section of tile board surfacing at juncture with edging around sink. Drawing at left above illustrates correct method of scribing tile board for necessary tightness of corner fit.



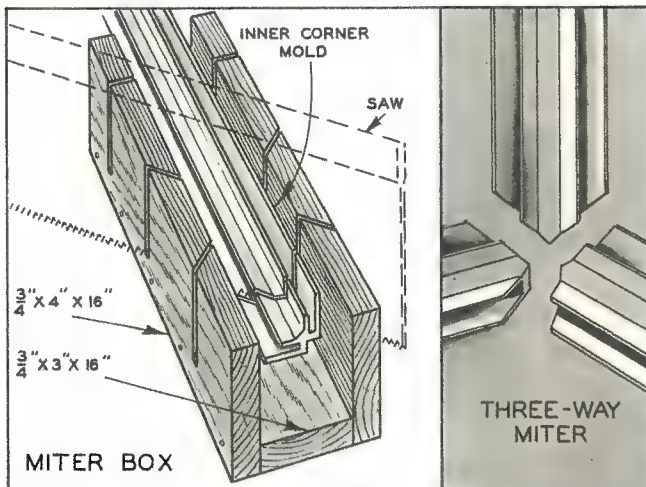
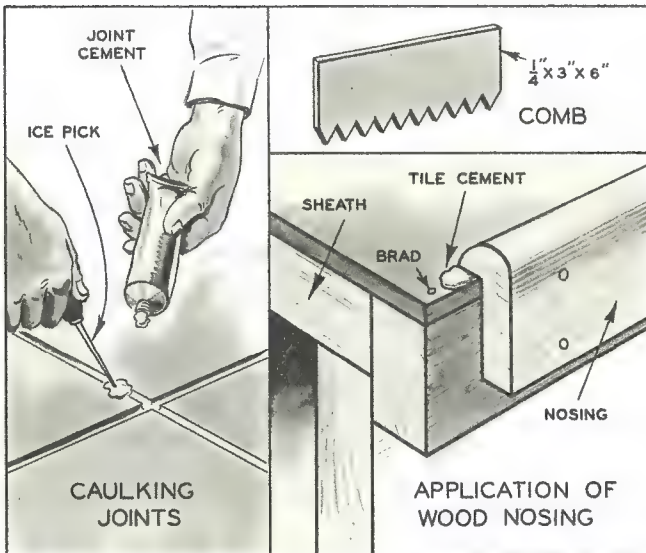
Surface to be covered with tile board is carefully covered with the cement as above, using a plywood comb. A small scrap of plywood with notched edge, shown in drawing, spreads cement.

Scribing a sink corner block. The pencil is guided by the curve of the tile board. Smooth curves on these blocks make neat job when edging is applied later, so cut board and block right.





Applying edging around sink with cement. Stick shown in lower left corner of photo is wedged across sink to act as clamp and hold until cement is firm. Use protective end strip on stick.



Cut the tile board to the best advantage, but use pieces as large as practicable on the drain-board and counters, making joints at the sides of the sink between the corner curves. To lay out for the sink opening, place the sheets in position and mark by contact with the sheathing.

The tile board is cemented down and weighted. If any nailing is done, keep the nails in the white lines where they can be puttied, or drive them near the outer edge where a wooden nosing can be used to cover the heads.

To install the edging, apply a ribbon of cement for about 2' and spread joint cement on the tile board. Starting at the center of the near side of the sink, press the edging in place, adding cement when needed, until the plastic overlaps the starting end. Cut it to length, cement the end, and hold with sticks clamped across all splices, or joints. Protective strips of paper mounted between the sticks and the edging keep cement from sticks. Cement squeezed out can be removed with a rag dampened with solvent recommended by the manufacturer.

The same edging can be used for the nosing of the drainboard, if nails do not need to be covered. Point up open joints and nail holes with joint cement and see that the edging is well caulked.

When the entire job is completed, you will find it both attractive and durable. The grooves between squares are of such a contour as not to collect dirt, permitting the entire area around the sink to be kept sparkling. If joints in the board have been carefully made they will be equally dirt-free and easy to keep that way. Cement along the nosing seals this also.

Details of nosing at front of tile board surfacing are shown in top sketch. Ice pick makes good tool for caulking seams where board pieces are joined. Method of cutting moulding at left. Cut plywood cement comb from scrap.

Reversible Switch for Split Phase Motor

THE problem created by numerous power tools with only a single motor to run them is often complicated by the need for a simple method of reversing the motor to suit the different tools.

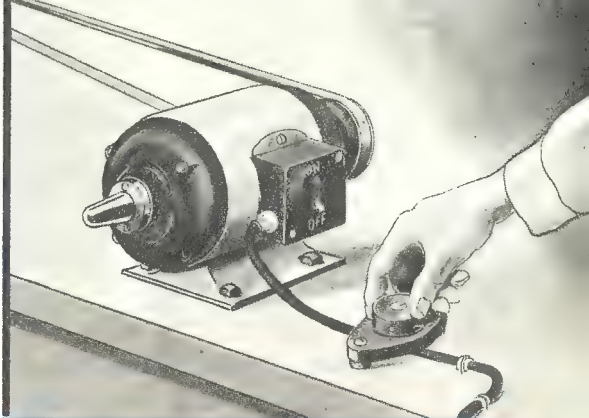
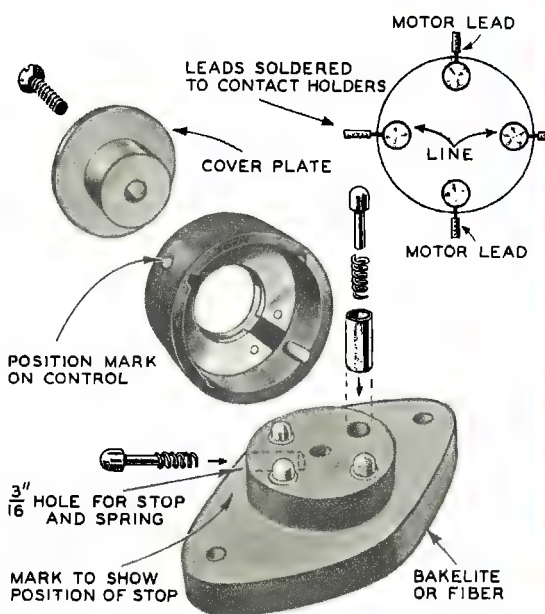
This unit is simplicity itself, and an interesting lathe project. It can be attached to the motor or screwed to the workbench, as in the illustration.

Main body of the switch is bakelite, fiber, or suitable plastic. Round part of base where contact pins are carried, is turned on lathe, oval shape of lower part is jigsawed later. Original piece of material mounted in lathe faceplate can be rectangular.

Holes are drilled as shown, to take contact pin holders and contact pins, all of which are made from brass rod, such as brazing rod, $\frac{1}{4}$ " and $\frac{3}{16}$ " diameter respectively. If fine springs of the size shown are not readily available, it is a simple job to turn them on the lathe, using light gauge piano wire.

The brass contact plate is made from a washer, sawed in half, and held in place on the control dial by four screws. Ends of screws are turned off flush with surface of contact plate.

Wire the switch as indicated in diagram, soldering all wires to bottoms of brass contact holders on underside of switch base. Dot on switch control dial tells motor direction.

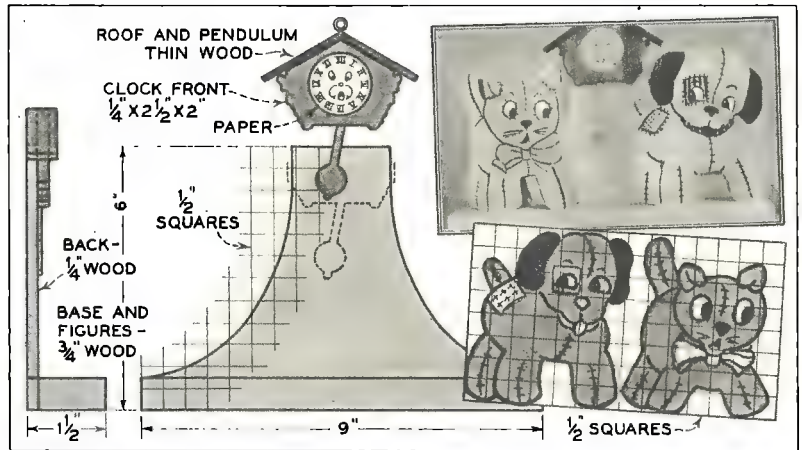


The Gingham Dog And Calico Cat

THIS amusing little wall plaque will capture the fancy of any child, and anyone can quickly make it up with a minimum of time, tools and materials.

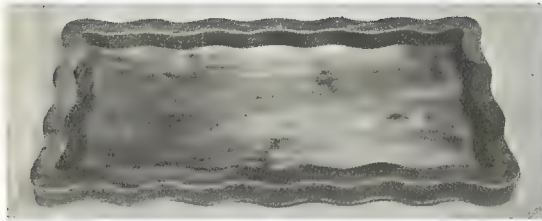
The "gingham" dog and "calico" cat figures, and the base, are cut from $\frac{3}{4}$ " pine. The end of a fruit crate is ideal wood for this, though it must be smoothly sanded. The clock and the back piece are $\frac{1}{4}$ " wood and the clock roof and pendulum are slightly thinner. A good job of sanding is essential to a good finished picture.

Nail the base piece to the back with 1" wire nails. Nail the roof to the clock with $\frac{1}{2}$ " brads. Clock, pendulum and animal figures are fastened to the back with glue and wire nails. The feet of the dog and cat figures should rest on the base piece, which repre-



sents the table on which the famous pair sat.

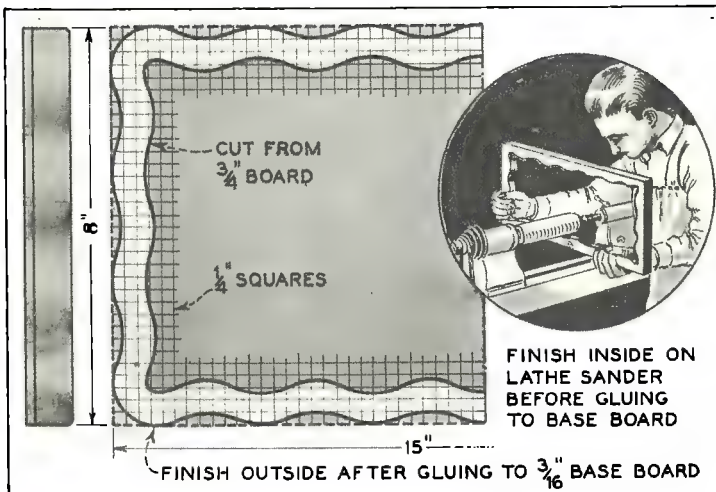
Use bright colors in the painting of the plaque, for it is the painting that adds the character and makes the piece unusual. The clock is finished differently. This is stained with mahogany oil stain, which is rubbed down after fifteen minutes to show the grain of the wood.



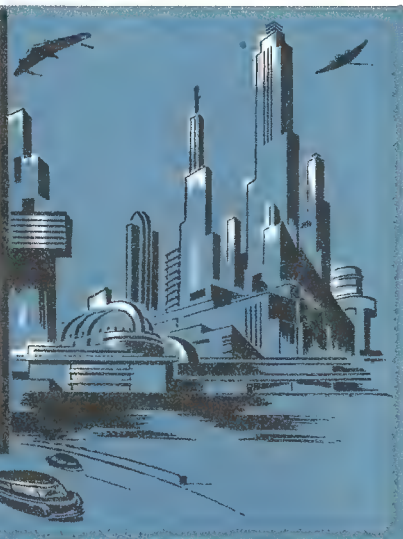
Wavy Edged Walnut Tray

THIS unusual wavy edge tray is easy to make from walnut stock, and any hostess would be proud to include it in her serving equipment. The inside surface of the wavy frame is first sawed out on a bandsaw or jigsaw and then sanded. A small drum sander in the lathe is most convenient for this purpose. A simple one can be made by gluing sandpaper on a turned stick.

The frame is glued to a $\frac{3}{16}$ " board which forms the bottom of the tray. The outside wavy edge is then cut and sanded. This completes the tray except for the finishing. Shellac rubbed down between coats makes an attractive finish. After this the tray should be well waxed and polished. Felt or blotting paper may be glued to the bottom to prevent marring highly polished surfaces.



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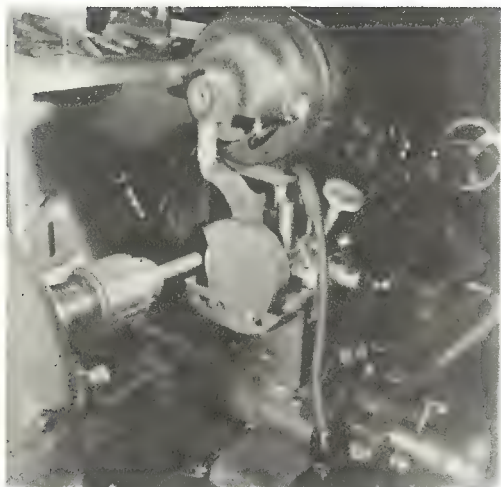
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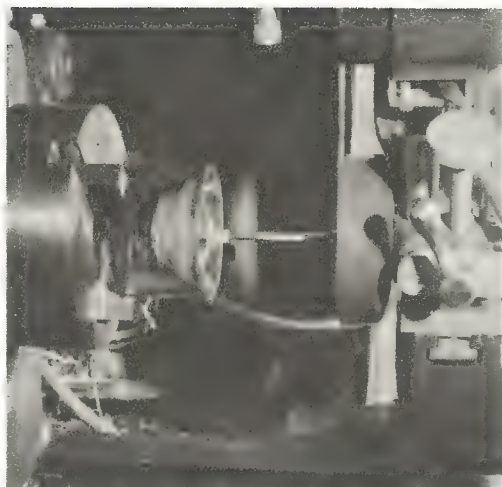
FREE BOOKLET
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Unconventional GRINDING

by Josephine Von Miklos



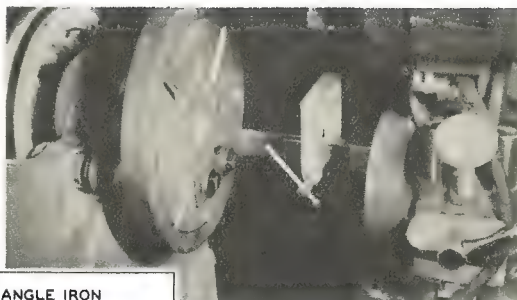
Tool-post grinder in metal-working lathe, grinding a piece of drill rod. Use lathe stop to avoid damage to chuck; no more than .002 cut at a time.



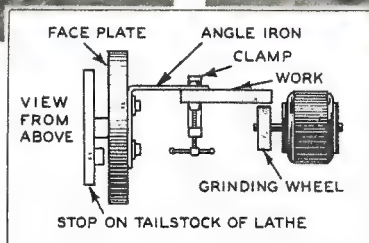
Internal grinding: making wider and more accurate hole in plastic. Lathe stop is important to prevent broken quill or grinding too far.



Setup on wood-working lathe to grind one end of metal plate. Lock headstock to avoid turning of faceplate. Since there are no stops, mark your piece.



Close-up of previous arrangement showing fixture on plate. Note method by which work is fastened; make sure all bolts are tightened. Diagram at left.



Grinding is important to precision and finish; use a tool-post grinder in your wood or metal lathe.

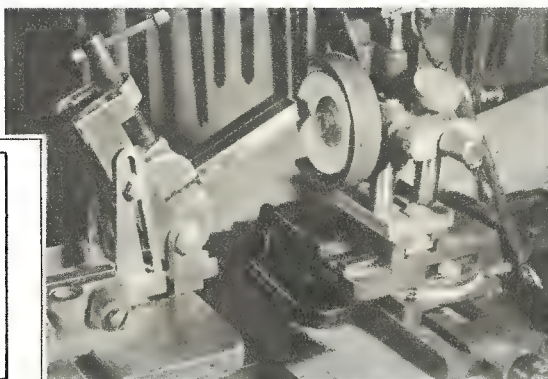
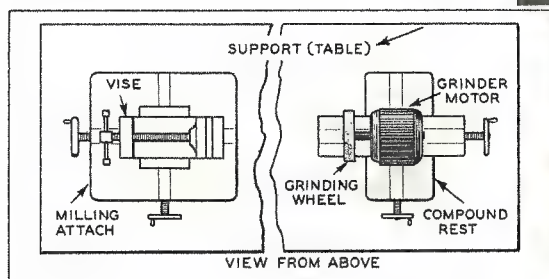
GRINDING puts the last finishing touches on a piece of work. Used generally in the closest of precision work, it is equally applicable to many jobs of the home workshop, particularly when precision itself is less important than perfection of finish.

A tool-post grinder is an extremely handy piece of equipment. It will pay for itself many times, particularly if you can make use of it in those jobs you do for friends and

neighbors. Old automobile valves can be ground to their original finish in a lathe, or even a worn-out center can be restored to a perfect angle. But even if you do not own a metal-working precision lathe, a tool-post grinder works well on a woodworking lathe, or even in conjunction with a milling attachment.

Important to remember, no matter what you grind, is that your grinding wheel must

Milling attachment and compound rest; use on any rigid surface or lathe bed. With angle vise, angle grinding can be accomplished. Size of vise determines range of jobs possible. In this case, also, rigidity is very important.



be kept clean; it should be dressed either with a diamond or a piece of carborundum; an old broken grinding wheel does quite well for this as long as it is of a harder grade than the wheel you are using. Then you must never take a big cut, preferably no larger than .002 at a time. If you want a perfect finish, just run the wheel over the surface to be ground, without taking any cut at all the first time. The softer the material you grind, the more care has to be taken not to make too much of a cut if sizes are to be held.

Ordinarily you'd apply grinding primarily to metals, but there are a number of cases in which an amazing degree of accuracy and perfect smoothness of finish can be achieved on plastics, too. This holds particularly true if you want to machine a piece of molded plastic which is always much harder than the ordinary plastics such as acrylics (Plexiglas and Lucite), or cast resins, or even acetates. As a matter of fact, if you are confronted with the necessity of repairing such an item as the plastic handle of your iron by making a screw hole larger, an internal grinding job will do very well.

If you have not only a woodworking lathe,

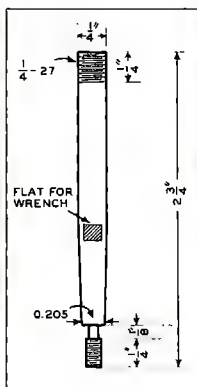
but a compound rest for metal working, also, the proper size tool-post grinder can be used. Rigidity of support both for work and grinder are essential. An unsteady support or grinder will leave unsightly waves on the work and eliminate all possibility of accuracy. Some of the suggested methods shown here would not meet with the full approval of professional machinists who are used to perfect setups in the proper type of machinery, but as long as you are careful and take it easy, you will find that where there is a will, there is a way.

More tricky than external is internal grinding, for in this latter it is easy to take off too much when there is only very little to be removed. Since we are dealing with hand feeds, if we don't use a precision lathe, careful marks on the work, outside stops, or any other method of marking, are important. In the horizontal planes, we can always measure in thousandths, as long as we use a compound rest and a milling attachment. Vertical feeds are a different story; the best bet would be to set up every job in such a way, that only the horizontal planes are used, and this can be done in many cases.

If you find that [Continued on page 132]



Small mandrels can be fitted to grinding mandrels by threading 5(3/4)-40; for inside finishing.



Boats and Boating



Do you know how to plot a speed-power graph for your boat? Are you sure you have the correct propeller and engine installation? Here are the basic facts.

by William F. Crosby

IN PREVIOUS pages we have discussed sailing boats and sails so this month we shall devote some space to those of you who are more interested in power as a means of propulsion.

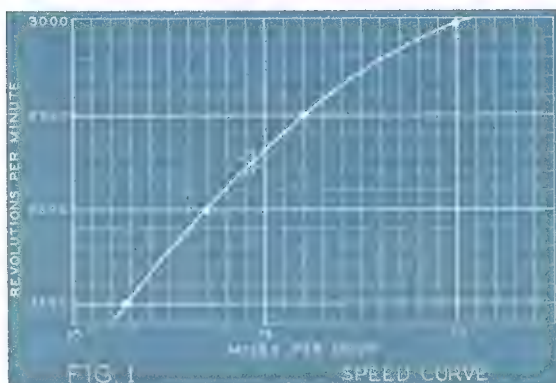
The speed curve, shown in Fig. 1, is something that every power boat owner should have for his particular boat. The only thing necessary to construct one of these curves is to know the revolutions per minute of your engine and then run the boat over an accurate measured mile several times at various

speeds. This particular curve is not for any special boat but will simply show how such a curve should be constructed.

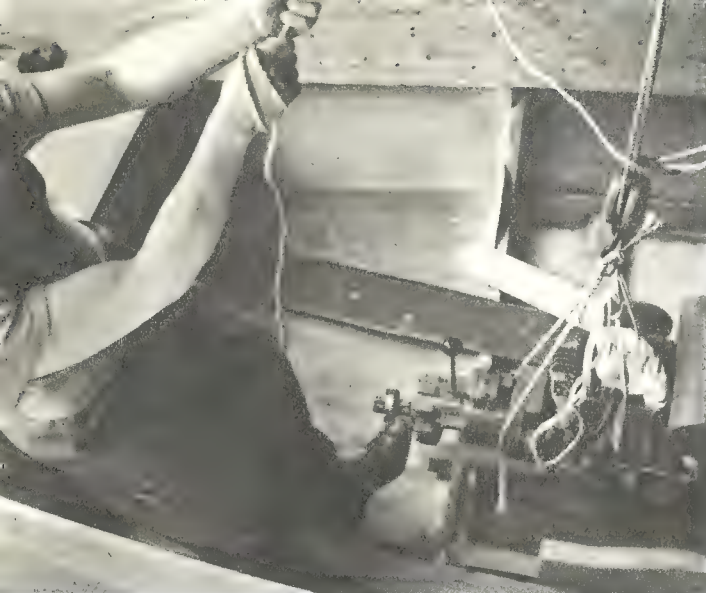
Suppose we run the measured mile at the various spots marked with little circles, the first one at 1,500 r.p.m. We run the boat both ways over the mile, with and against the current and time it accurately, making sure that the r.p.m. stay the same throughout both runs. We then take the average time and with this figure the miles per hour. In this case we come out with 11.45 miles an hour. We mark this on the piece of cross section paper with the little circle where 11.45 miles crosses the line denoting 1,500 r.p.m.

We now make the two runs again, this time at 2,000 r.p.m. and by figuring our time we come out as having averaged 13.45 miles an hour. Again we make a mark on the cross section paper as close as possible to where 13.45 m.p.h. crosses the line showing 2,000 r.p.m. Once more we repeat the process at 2,500 r.p.m. and plot this on the cross section paper. For the final reading we find that the engine will not quite come up to 3,000 r.p.m., the best we can do being about 2,990 r.p.m. At this speed we find that we are doing just 20 miles an hour so this is also plotted in on the paper.

We now have a series of four spots on the paper and the next step is to run a fair line through all of them. If any one is way off to one side, you may be pretty sure that you have not taken the reading exactly right and it is best to rerun that pair of trips. The more accurately we have done the work, the closer our fair curve will



This is the way your boat's performance chart will look, prepared according to the author's instructions.



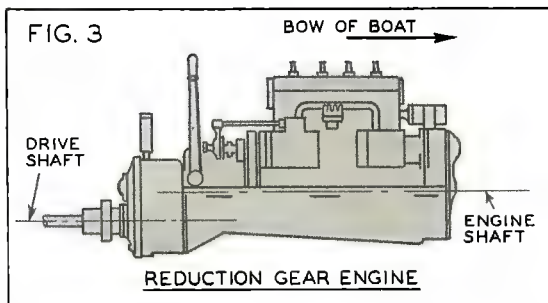
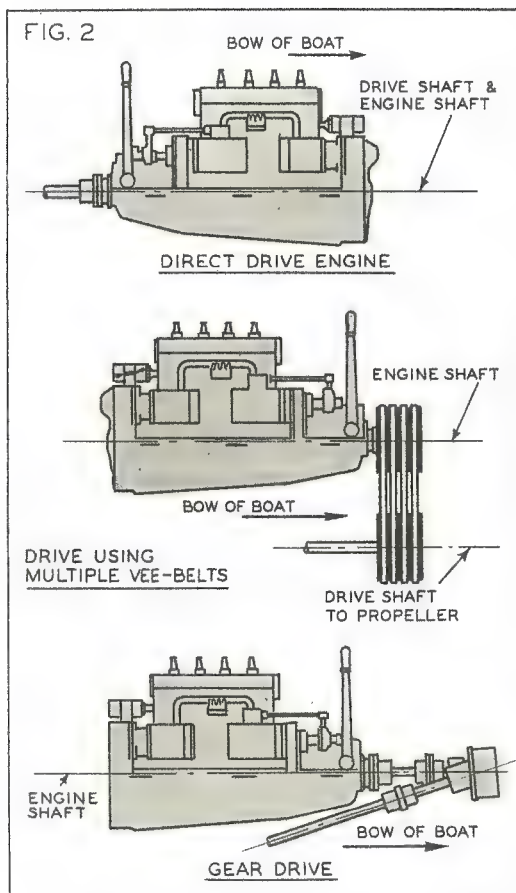
Lowering a small, air cooled Lauson engine to its bed. This will have direct drive with reduction gear, as in Fig. 3, permitting use of larger, slower propeller to get more h.p. with less slip.

come to passing through all the spots.

By this time you may be wondering just what good all this will do. Suppose, some day that you get caught in a heavy fog on a long run. You know about where you are at the start and you know your course to your destination. This information is of great value but by knowing the exact speed of your boat you can make a further check. Plot your position as closely as possible on the chart together with your course and destination. Then measure the distance to where you want to go with a pair of dividers. By looking at your engine tachometer, you will find out the number of revolutions per minute that she is making. Suppose we find 2,250

r.p.m. We now refer to the speed curve and by reading across the line that would be 2,250 r.p.m. we can quickly discover that we are making about 14.3 miles an hour through the water. If we have a tide against us we can guess the strength and allow a little for that. If the tide is with us, we can again guess and figure that it will take a little less time to reach our destination. Tide tables are available and should be on every power cruiser. These will take the guess part out of it.

Thus, we now have a known distance to cover and we also know very closely the speed of the boat. With these two factors we can estimate fairly closely exactly how long it will take to reach our destination. This is called "time and distance piloting" and is a safeguard and also well worthwhile from the standpoint of interest. [Continued on page 138]



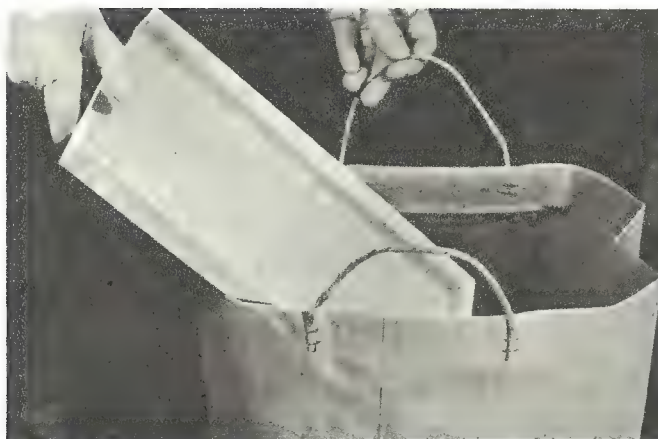
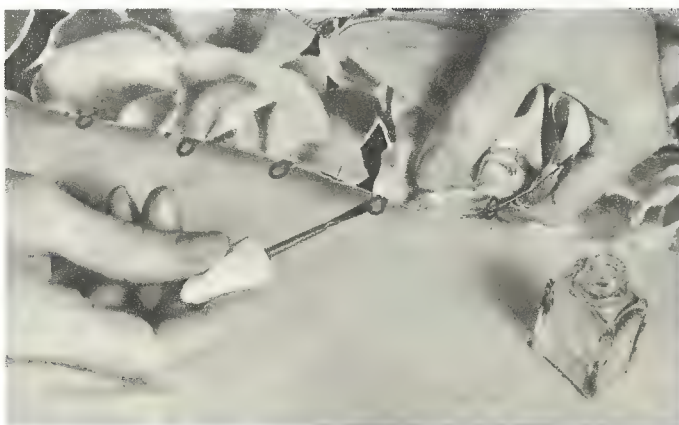
Three types of engine installation in use at present. Top, direct drive for light craft; center, belt and pulley drive; bottom, V drive. Latter two are for tight space.

Most heavy cruisers and auxiliaries carry the above power equipment. In deep vessels engine can usually be mounted level; or up to 15% angle in shallow craft.

HOME AIDS



BUTTON loops that have become worn or frayed are easily preserved by the application of a coat of clear nail polish. This soaks into the loops and causes the fibers to adhere to each other, adding to the strength and durability of the loops. In many instances it will be found worthwhile to coat the loops of new garments in this manner to prevent early fraying. The loops remain flexible, and show little change in appearance.



YOUR paper shopping bags will last longer and they'll be more convenient in use if you place the lid from a cardboard shoe box in the bottom of the bag you are using. This spreads the bag, making it easier to deposit articles in it, and also keeps the bottom of the bag dry when moist grocery items such as meat or iced vegetables are in it. It also prevents annoyance and loss through bag breakage. The shoe box lid can be used many times.

IF YOU are shy on book matches a little peeling will turn 20 matches into 40 lighting stumps. The stunt started in the Navy. The boys at sea often have to stretch a limited match supply. Here's how you can do it, too.

Tear out a match smoothly from the book and clamp the flat sides near the bottom between your forefingers. That helps your thumbs to work a wedge between the two cardboard strips that make up the stems of

most book matches. Now you pull apart the two sections slowly, moving your forefingers along toward the tip so that the slit will be even.

Two flabby, apparently useless paper pieces are left, but each tip has a combustible surface on one side. One or two scratching experiments give the know-how "feel" for striking the extra half-match safely. You'll find this stunt handy as a match stretcher.

Useful Stunts You Can Do With Adhesive Tape



A strip of adhesive tape placed on the sole of baby's shoes as shown, will keep him steadier on slippery floors, and lessen the danger of slides and tumbles.



Pictures won't slip and hang at crooked angles on your wall if you wrap a little adhesive tape around the center of the picture wire. It holds them level.



You can measure the distance from your camera to the subject you're to photograph, by putting adhesive tape around your light reflector cord at 1' intervals.



Reduce the risk of ruining photographic prints through slippage on the trimming board. Place a strip of adhesive along edge near cutter, as shown, to stop.

If your hat is a trifle large, put a strip of adhesive tape around inside of the front half of the sweatband, as shown. It doesn't show, and it makes a hat fit.



The Well Dressed MP

MP's with bulging biceps that keep popping their arm bands off, or those who don't have enough muggle to keep the pesky things from slipping down will find useful the idea of Cpl. Robert Hausner, Camp Livingston, La., who says:



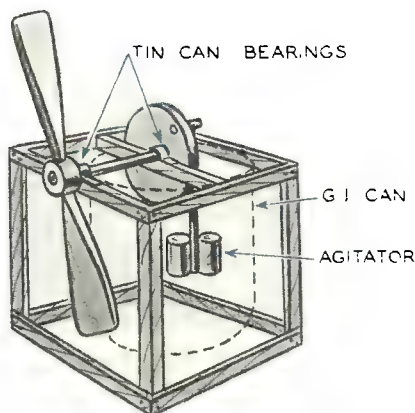
"The Military Police arm band which is issued to us is simply a piece of cloth about 14 inches long which we wrap around our left arm and pin in place. Frequently the band works loose and becomes a nuisance. I've discovered an excellent way of making mine stay put. Two pieces of elastic about four inches long are sewed to the ends of the arm band, which should be trimmed short enough to exert pull on the elastic. The

latter can be obtained from an old pair of garters or suspenders. The resulting streamlined arm band is just slipped on—to stay."

Windy Washer

Pfc. Gustav C. Hertz, L.A.A.F., Laredo, Texas, tells us about a miscellaneous Maytag that the boys in his outfit have been using.

"Every G.I. who has had to do his own laundry (and what G.I. hasn't)," says Gus, "will appreciate the pictured device which was built and is used by the men of Section K at the L.A.A.F. The washing machine, for such it is, is powered by the gentle Texas



breezes which swirl across this Army Air Field. Although the machine is very simple, being built of scrap materials, it is also efficient, and other G.I.'s may wish to copy it.

"A regular 32 gallon G.I. can, approximately 26 inches deep by 20 inches diameter, serves as the tub. This can is mounted on a base of 2x4's. A framework, also of 2x4's steadies the can and supports the driving mechanism, which consists of a propeller mounted on a drive shaft. The propeller, cleverly constructed by Sgt. Bob Rountree, is comprised of a wooden hub into which is fitted two sheet metal blades, each 4 inches wide and 26 inches long. The drive shaft itself is a piece of pipe 24 inches long. This rides on bearings cut from strips of tin cans.

SERVICE MEN ATTENTION!

This is your department, and if you like it enough to want to make it better, you can. It's all up to you! Send in your ideas—anything you think may help your buddies in the Army, Navy or Marines. You'll be helping yourself too, because MECHANIX ILLUSTRATED pays from \$2.50 up for material used. Address "Ideas for Service Men," MECHANIX ILLUSTRATED, 1501 Broadway, New York 18, N. Y.

A wood disk 1 inch thick by 12 inches in diameter fitted to the end of the shaft activates the agitator drive rod, a piece of $\frac{1}{8}$ inch by 1 inch by 24 inch strap iron bolted loosely to the outside edge of the disk's face. Agitator is made from two No. 3 cans, inverted and attached to the end of the agitator drive rod.

"We have found by experience that while the machine will never take any business away from the regular laundries, it does beat washing clothes by the well-known G.I. hand method. Shirts, socks, shorts and handkerchiefs come out nice and clean and will pass the most rigid inspection. After building your machine, fill it $\frac{2}{3}$ full of hot water, add a cake of flaked G.I. soap, throw in your duds, then sit back and whistle for a breeze.

"P.S. During a recent Texas tornado our washing machine was blown away, much to our regret. Last week, however, one of our aerial gunnery students claims his B.T. 19 was passed by Section K's washing marvel, churning up a good 125 r.p.m.'s. The gunner swears he made a quick



deflection shot at it and scored a direct hit. The C.O. is still trying to decide whether to give the student official credit for the first 'washing machine Charlie' shot down this side of Guadalcanal or gig him for failure to wear his oxygen mask above 10,000 feet."

Bug Trap

In India they have bug trouble. It seems the insects keep flying around the lights at night, making life miserable for late sitter uppers. Apparently the situation is not greatly different from what we get around here on summer nights, except in degree. Cpl. Edwin L. Brooks got sick of swatting the



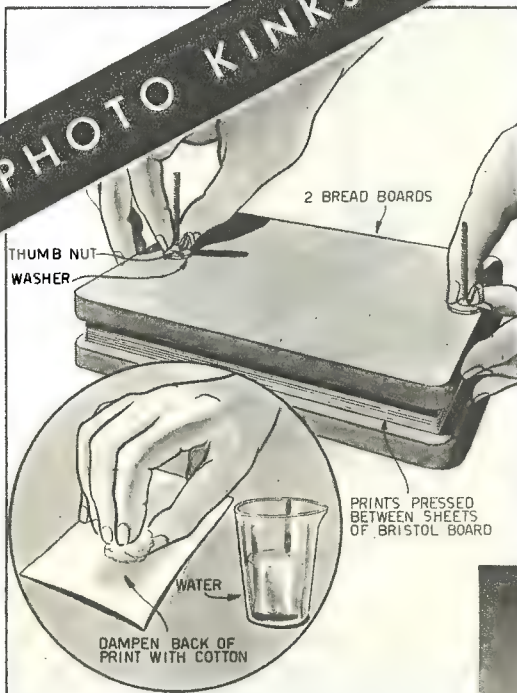
pests, so he rigged a trap on the light by hanging an inverted lamp shade under it. A beer can (with top lid cut away) attached to the small opening of the shade and containing some G.I. bug killer functioned as the lethal chamber. Now Cpl. Brooks sits contentedly as the small winged victims slide unwittingly to their gooey doom.

.50 Cal. Clock Stand

Cpl. C. C. Purcell, De Ridder, La., has designed a very [Continued on page 142]



PHOTO KINKS

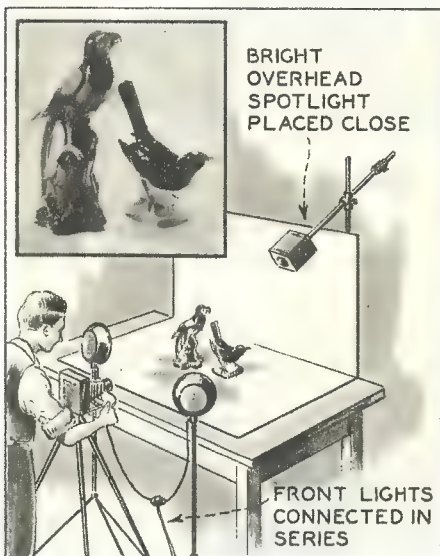


TO FLATTEN PHOTOGRAPHS thoroughly after they have been dried, they should be dampened slightly on the back only and put in a press between sheets of Bristol board or some similar paper for about twenty minutes. An easy way to make a press for this purpose is to take two hardwood breadboards, drill holes at each end of the two boards, and use two bolts with thumb nuts to bring pressure on the prints.

SOME CHEMICAL SOLUTIONS, especially developers, are inclined to be a bit "slippery." If you attach two strips of adhesive tape to the opposite sides of your graduates and bottles, you will lower the casualty rate among these items. Your fingers will be able to grip in spite of spilled solution.



TO WRITE ON A PRINT and make the writing permanent, use this simple method: obtain a soft, blunt pencil and, before the print is exposed, write on it the required message. During the printing, the writing will prevent exposure in that area, and after erasure when print is dry, writing will be white.

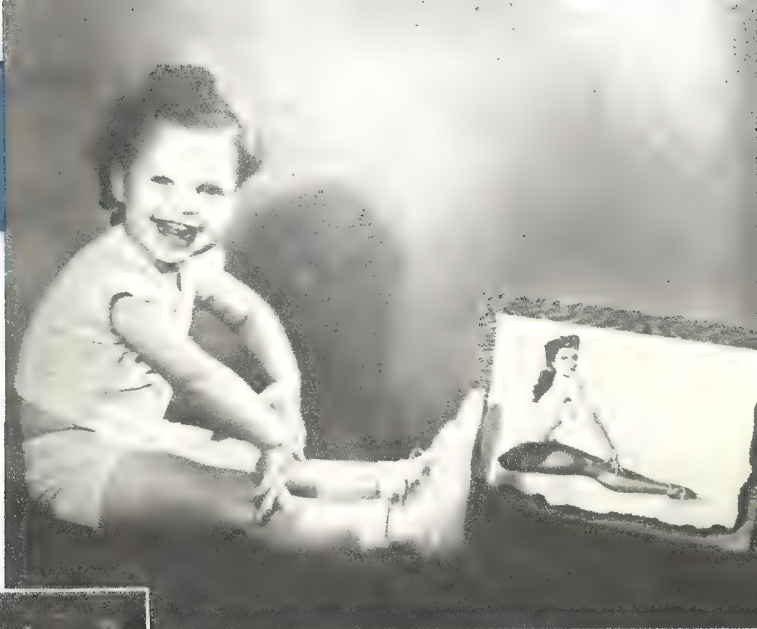


OBJECTIONABLE SURFACE GLARE caused by strong reflections from glazed table-top photo subjects can be eliminated by subduing the lamps producing the glare. Burn some at reduced intensities by connecting in series, and regulate others by shading or varying distances to the subject. Back light usually can be left full strength.



PHOTO CONTEST

FIRST PRIZE (\$10.00): *Copy Cat*, by C. Jerry Derbes of Jackson, Miss., taken with a Super Ikonta B on Plus X film. **SECOND PRIZE (\$5.00):** *Country Church*, by John Makar of Detroit, Mich.; taken with a Rolleiflex on Verichrome film. **THIRD PRIZE (\$4.00):** *Thirsty Pals*, by June DeBella of San Jose, Cal.; taken with a Voigtlander camera. **FOURTH PRIZE (\$3.00):** *What Is This Creature?* by Samuel H. Dooley of Cumberland, Md.; taken with a Kor-elle Reflex on Superpan Supreme.



1st PRIZE

COPY CAT

← **2nd PRIZE**

COUNTRY CHURCH



3rd PRIZE

THIRSTY PALS

← **4th PRIZE**

WHAT IS THIS CREATURE?



Submit contest prints unmounted—no larger than 8x10 inches. With each print list camera, film, lens opening and shutter speed, illumination, and developer. Write your NAME and ADDRESS on the back of each print and wrap securely with cardboard or corrugated stiffeners. ENCLOSE POSTAGE for the return of unused prints. Published prints cannot be returned. Judges are ME editors. In case of a tie, duplicate prizes will be awarded. Address: Photography Editor, MECHANIX ILLUSTRATED, 1501 Broadway, New York 18, New York.

THE CAMERA LIES

Photos by Camera Clix



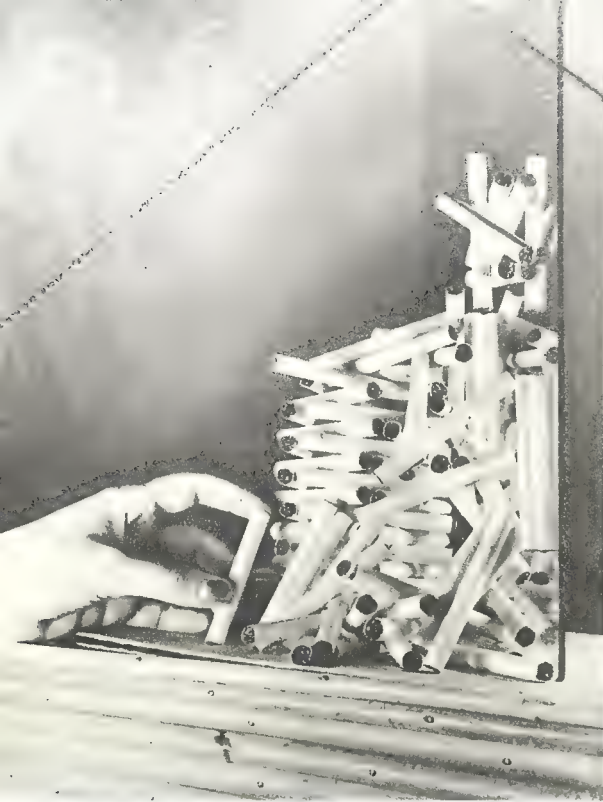
Here is a beautiful fake. The man in the picture is not on the verge of catching a tossed magazine; the pages of the book were carefully folded and pasted and then suspended on a string stretched across the room.

YOU'VE seen shots like these, taken with high-speed stroboscopic cameras. But these particular pix needed no such expensive, complicated equipment; they are *stills*—

believe it or not. A simple box camera and a bit of ingenuity are all that are needed to turn the trick. Just set the stage, adjust your lights and shoot.

In the pic at lower right, has the camera caught the sugar pouring into the bowl? No; glass plate is rubbed with olive oil and sugar is sprinkled on it. Bowl and spoon are placed and vertical shot made as at left.

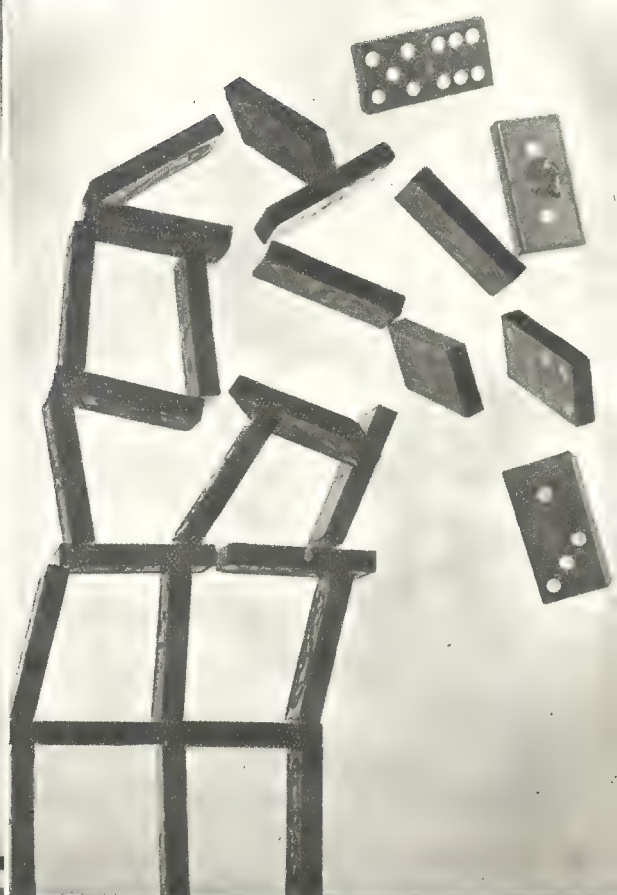
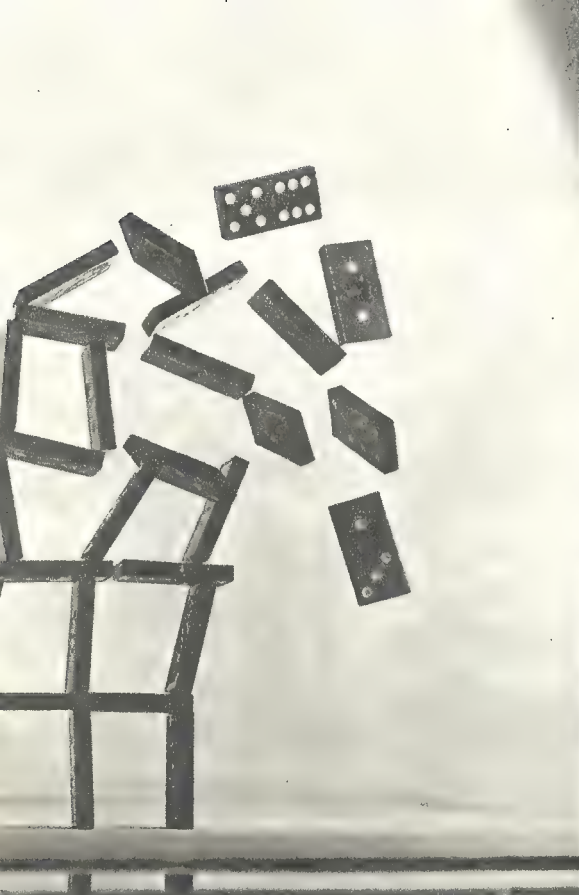




At right, a ball has been thrown into a tower of cigarettes and the camera has caught the tragedy, or has it? Cigarettes were pasted on glass (left) and ball placed in position. Pic was taken from rear through glass.

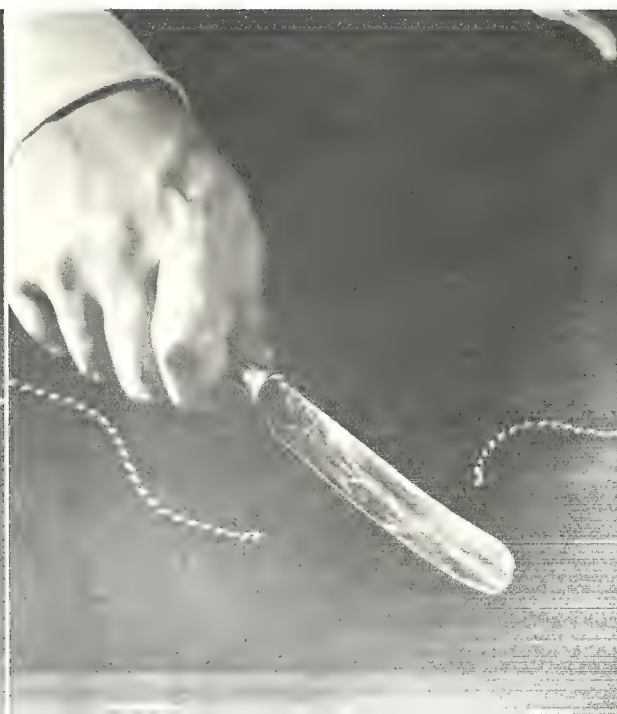
Under pressure of the steam, the cap apparently jumps from the kettle of boiling water at the lower right. Actually cap was glued to pane of glass and position adjusted until it was a few inches from spout (left).





At upper right a delicately balanced tower of dominoes is toppling to the table below. Actual setup was made by arranging and pasting the dominoes on a horizontal glass plate, after which a vertical pic was taken.

At first glance it looks as though the photographer had caught the very moment when a string was cut in two (lower right). The "string" is in reality a piece of stiff wire bent to look like piece of breaking string.



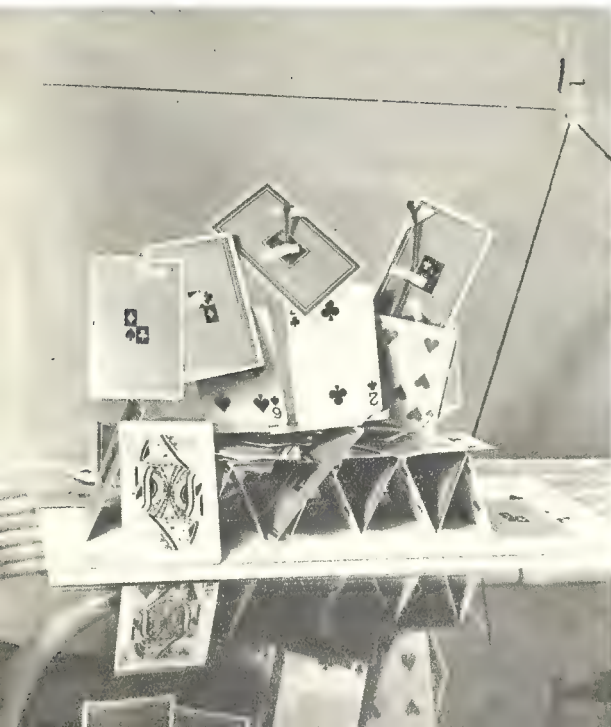


Glass is NOT being cracked by hot screw driver: the cracks are paper cement which also holds glass piece.

Corks are apparently falling from paper bag (right); actually were skillfully arranged on pane of glass.



The camera has caught a collapsing house of cards at lower right. In setup (left) cards were held in their required position by means of glue, paper strips, threads and molder's clay. Make sure all props remain invisible.



KEEP IT ROLLING!



by Frederick C. Russell

HYDRAULICS GUILTY? Yes, you are justified in suspecting trouble with the fluid system of the brakes when a check of the mechanical parts fails to hold a clue as to the reason for lack of equalization. For such checking have a service man use a line gauge to measure and to compare pressure at the various lines. With the aid of this he'll be able to locate clogging, a pinched line, overheating of a line that happens to be too near the exhaust system, or leakage.

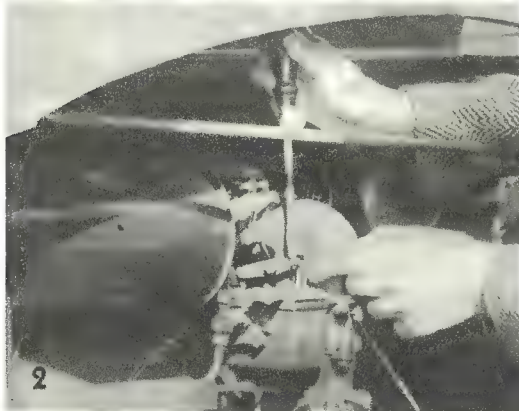
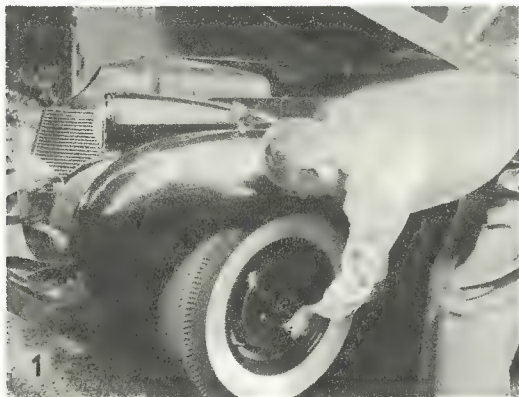
WHEEL NOISES often can be checked by driving a few miles with one of the wheel nuts removed. It is also a good plan to loosen all the nuts and retighten them if the noise persists. The wheel should be jacked clear of the ground for the final tightening. Fig. 1.

A **WIDE VALVE SEAT** would naturally seem to be the answer to maintaining good compression, but in practice a narrow seat is better. Carbon is too free to be trapped on a wide seat whereas if the seat is narrow particles of carbon actually are cut. With a narrow seat there is more risk of warpage, however. Guard against overheating.

JUDGING THE BATTERY by the speed of cranking is a poor test of its strength because the starter-motor may need servicing or the engine's oil may be too heavy. A better clue to battery condition is the situation when the lights are switched on with the engine idling. Here the lights are operating from the battery. If they are dim, but brighten when the engine is speeded up, the battery needs a recharge.

POOR ACCELERATION may be traced to the air cleaner binding against the accelerator pump's arm. If the engine lacks get-away, make sure this arm is free. Fig. 2.

FOR SAFETY'S SAKE here are two ways you can stop the engine in an emergency should the need arise while you are working



"Fliers are not Expendable"

— says our Navy

DOWN at sea! No fun at best, but it makes a world of difference to a flier's morale to know that, *if it happens*, every effort will be made to save him!

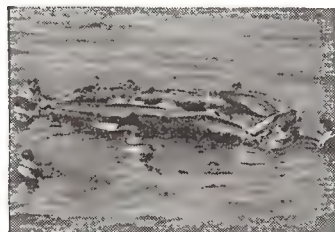
He knows that new and amazingly efficient rescue equipment is ready to be swiftly flown to him. Recently perfected air-sea rescue techniques include shipwreck kits for one and for many men. Most complete of the several Navy rescue assemblies is the AR-10. Designed for release from a bomber's bay, this "train" of five buoyant packages, linked together with a long floating line, provides complete survival equipment for ten men.



1 A rescue job for the AR-10 assembly! Dye marks in the ocean lead this searching Navy "Avenger" to a shipwrecked crew. Out of the bomb bay goes the 240-yard train of packages.



2 The pilot has dropped the train on the upwind side of the swimmers so that entire assembly floats to survivors. The first package opened is the one containing the large rubber lifeboat.



3 As boat package is opened, inflation automatically begins, while survivors cling to lines. Any of the packages will support an injured or exhausted man, who can be quickly drawn to raft.



4 A sea anchor is thrown out while boat is readied for voyage. Other packages are hauled in—an outboard motor, fuel, and two shipwreck kits containing every needed survival aid.



5 The outboard is mounted. Ample fuel is provided to swiftly power a good distance from enemy coast. Then motor can be quickly replaced with a collapsible rudder for use with sail.



6 The powerful Evinrude "Lightfour" is started and "the good ship AR-10" is underway, rigged and equipped for a lengthy voyage. Building motors for many critical war needs is Evinrude's job today. Intensive engineering constantly seeks ways to make these war motors finer . . . and still finer. Which is added assurance that the peacetime Evinrudes to follow will be *worth waiting for!* EVINRUDE MOTORS, Milwaukee, Wisconsin.

EVINRUDE



OUTBOARD MOTORS

BUY MORE WAR BONDS — AND HOLD THEM!

Folding Tea Tray

[Continued from page 101]

passing through holes in the upper ends of the legs joins the two "H" shaped members of the rack. The ends of the broomstick are fixed immovably in the outer legs by means of glue leaving the inner "H" to swing free.

In Fig. 2 the rounded ends of the legs are being smoothed with a strip of sanding cloth. This photo also shows the holes for the broomstick.

The tray measures 14"x24" with rounded corners. See drawing. The frame of the tray is cut in a scalloped design. A convenient way to hold the work for cutting is shown in Fig. 3. The tray is made of $\frac{1}{4}$ " plywood and the frame is held in place by means of glue and screws entering from the underside. The open corners of the frame make it easy to clean the tray. On the underside of the tray are four cleats glued and screwed in place. These cleats are shown in Fig. 4 as well as in the drawing. The horizontal struts of the "H" members fit between these cleats when the tray is in the rack. The cleats prevent the rack from spreading under the loaded tray and from folding when the rack is being carried.

Fig. 5 shows the tray being sanded prior to being painted. The finished tray and rack are given an undercoat of flat white paint followed by a coat of ivory enamel, and the tray is ornamented with floral decals.

Unconventional Grinding

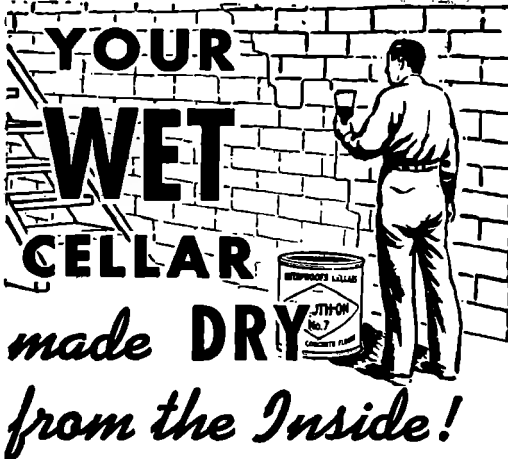
[Continued from page 113]

the one internal grinding quill which is furnished with the tool-post grinder does not take care of all the jobs you want to do, there are a few additional quills you can make yourself. As long as you use a $\frac{1}{8}$ shank and run a die 5-40 over about $\frac{3}{8}$ of the end, you can screw it into the quill and use the various wheels, polishers, buffers, which can be fitted to the mandrels as shown. Or, if you find you want to use rotary files for grinding and shaping, you can get a longer mandrel from your rotary supply house and make your own quill. The one end of the mandrel is threaded to hold the files; the other end has to be threaded to a size of 10-24, about $\frac{1}{4}$ " long; then, beginning at a point $\frac{3}{8}$ " inward, a taper is cut $\frac{7}{8}$ " long, at an angle of 3 degrees.

The various sizes of small grinding wheels, but particularly polishing wheels, will do a very excellent job of internal cleaning and polishing which, in many cases, is impossible to accomplish in any other way.

Paint identification by means of photomicrography is used by FBI in crime detection.

A fluorescent carpet can be lighted with weak, invisible ultraviolet rays generated from storage batteries.



This spring make up your mind to get rid of *for good* the drippings, dampness, and mustiness that come from cracked or porous cellar walls and floors. Waterproof them with Smooth-On No. 7 Iron Cement. Do it yourself—save delay and expense. Apply Smooth-On like paint—goes on wet walls or dry, on stone, brick, concrete. Hardens in 24 hours, expands to fill cracks and crevices, forming a tight metallic seal.

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Comes in 5-, 25-, 50- and 100-lb. sizes. 25-Lbs. covers 100 sq. ft. Ask for Smooth-On No. 7 at your neighborhood hardware store. If they haven't it, write us direct.

FREE REPAIR HANDBOOK

Besides full directions for waterproofing your cellar, this free, 40-page, pocket size manual will give you information and instructions for stopping leaks, sealing cracks and tightening loose parts in heating and plumbing systems and other home equipment. 170 diagrams. Just send coupon.

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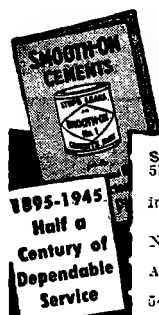
Smooth-On Mfg. Co., Dept. 69,
570 Communipaw Ave., Jersey City 4, N. J.

Please send me my Smooth-On Handbook and information on Smooth-On No. 7.

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Address

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"NOTHING CAN STOP THOSE HARLEY-DAVIDSONS"

FROM "Somewhere in the Pacific"
comes this dramatic letter from
Sgt. John V. W.

"Have been in the Army for two years.
Cannot tell you much, but I have put
in a good many hours on the Harley-
Davidson 45 and have been through
mud and all kinds of weather. It rains
most of the time over here, but nothing
can stop those Harley-Davidsons—not
even bullets. I know for I have been
shot off of them! My name for my
Harley-Davidson is "Commando" and
that's just what it is."

Thanks to you, Sgt. John V. W., and
to thousands of combat riders like you,
the days will come again when red-
blooded motorcycle fans can take in
race meets, hillclimbs, endurance runs,
pleasure trips and all the other joys of
motorcycling. Plan to be riding with
the rest of the gang on a brand new
Harley-Davidson of your own!



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Please send at once free copy of 24-page
"Enthusiast" Magazine, filled with motor-
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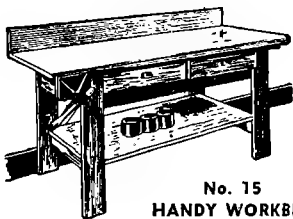
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It is also handy in the basement game room as it takes up little space when folded. This is a real fascinating project. Price 25c.



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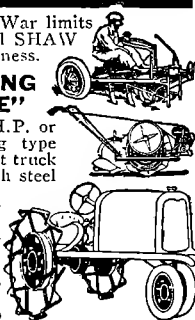
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Pocket Magnifier

[Continued from page 97]

pilot end no longer has any support, unless the piece is supported on a block into which the pilot hole extends.

Next make the case. Cut two pieces of sheet brass, Monel metal, or stainless steel approximately the same shape as the lens mounts but slightly larger so a strip can be soldered between them to form the back of the case. This strip is the same width as the combined thicknesses of the lens mounts. Bend it to the contour of the other two pieces, and silver-solder or braze it between them. Smooth the joints and polish the outside surfaces, and the case will look like a one-piece job. The hole for the rivet around which the lens mounts revolve should be drilled with the metal pieces clamped together before the parts are soldered together.

The lenses should not be mounted in their holes until after the case is done. The mounts are used in shaping the case, and if the glass is in them it may be damaged in the process of handling. An easy way of securing the lenses is to run a layer of quick-drying pyroxylin cement around the inside of each hole and push the lenses into position. Remove excess cement with a cloth before it sets; and after it has dried, scrape off any excess with a sharp knife blade.

Looking Hurricane In "Eye"

[Continued from page 44]

All low pressure storms operate in the same manner: they are whirlpools in the fluid that is air. Assuming that a "high," or area of high pressure, is a mountain in the sea of air, a "low" is therefore a valley of air. The atmosphere rushes off the highs into the lows, as water runs off earth contours. This movement is wind. It does not flow off directly, but flows off the air mountains around them and in a clockwise pattern, entering the valleys in a counterclockwise pattern. This it does in the northern hemisphere while the procedure is reversed in the southern hemisphere.

The piling up of air around the rim of a cyclone's funnel causes an increase of air weight upon the earth's surface below. Hence it may be said that an abrupt rise in the barometric pressure and then a steady fall of the mercury might be a hurricane warning. This may be seen on the pressure chart at the places marked "X." Note too, the abrupt drop of pressure in the area of the "eye."

Next August, September and October, when the tropical cyclones begin to hatch in the Indies area, the winged meteorologists will have another whack at learning exactly what happens in the much-argued-about chimney of clear air called the "hurricane's eye."

The U. S. Chemical Warfare Service tested about 4,000 chemicals during the World War.

UNTIL HIS JOB IS DONE...

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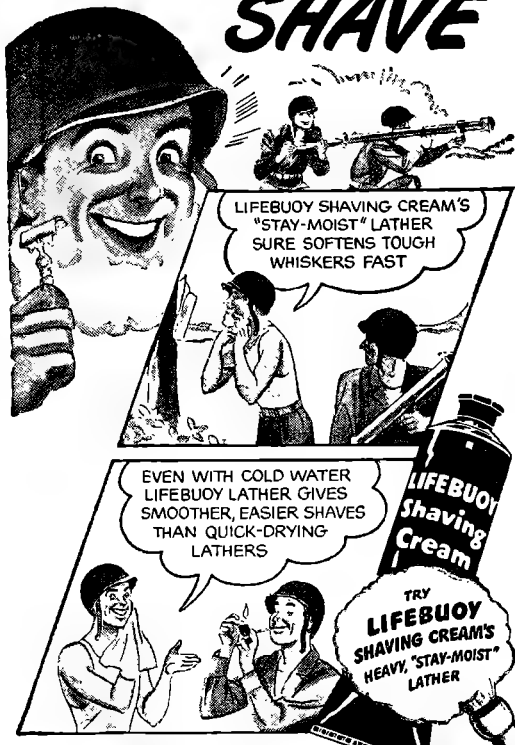
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The School Shop

[Continued from page 104]

these maneuvers, the plane is straightened out and a normal landing made as soon as a sufficiently low altitude has been reached.

When making a forced landing in mountainous country and no satisfactory field is within view or gliding range, a safe spot is a lake or reservoir. Land as close to the shore as possible so you won't have too far to swim. A seaplane with floats can make such a landing with ease, of course, and can even be landed on the grass of an airport with little damage. And taken off, too, believe it or not!

If your plane is equipped with a radio telephone and you find you must make a forced landing, give the distress signal recommended for this purpose: the word PAN repeated three times, followed by your location and the spot in which you are attempting to land. This will enable rescuers to come to your aid.

Remember, if in your landing you think you might run into difficulty, tighten your safety belt, shut off your gas valve and turn off the ignition switch before you set 'er down.

From this discussion you might be led to believe that emergency landings are quite common occurrences. They are not, however; they are the exception rather than the rule. Most of them can be negotiated without incident. But if you *should* run into that exception, bear in mind the advice mentioned herein and your landing, however difficult, will be a safe one.

The School Shop aviation lessons are being published in book form titled **HERE'S HOW TO FLY**; it's a book you'll need if you are planning to do any flying, and it will prepare you for your Private License.

There are 21 chapters and over 200 illustrations covering history, aerodynamics, navigation, meteorology, engines, load factors and parachutes, and a special chapter of 200 multiple-choice questions and answers like those used on C.A.A. Private Pilot Examinations. The price is \$2.50. Copies may be obtained by writing to the Aviation Editor of **MECHANIX ILLUSTRATED**. Make check or money order payable to the publishers, Duell, Sloan and Pearce, of New York.

The angler fish common in North Atlantic waters is known to eat at least 40 kinds of fish and shellfish and 10 kinds of sea birds.

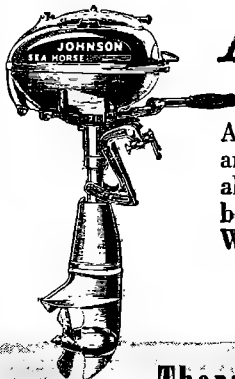
A photoelectric meter for measuring vitamin A concentration in fish oils has been devised.

Locomotives have nearly half again as much pulling power now as in 1918.

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Boats And Boating

[Continued from page 115]

Through this speed curve you can tell at any time, provided you know the r.p.m. of the engine, exactly what speed your boat is making through the water. Mind that "through the water" because the actual speed over the bottom may be greater or less depending on the strength of the current that you have. Such a curve is almost a necessity for power boats that are used in open waters or for coastwise cruising and if you ever enter your cruiser in any of those "predicted time" races run under the rules of the American Power Boat Association, the speed curve will be worth its weight in gold.

Engine Installation

There are a great many different ways of installing marine engines in different types of hulls and several of the most common methods are shown in Figs. 2 and 3. We are speaking not so much of the general installation as types of drives and their particular uses, because the wrong drive may completely spoil the performance of a boat.

At the top of Fig. 2 we have the conventional direct drive where the motor is connected directly to the propeller shaft and for each single revolution of the engine's crank shaft, the propeller and propeller shaft will also make a single revolution. This is the common type and it will serve best on the majority of boats. The engine, of course, must be suitable to begin with and a small, lightweight, high speed engine turning up a small wheel would never do on a big heavy cruiser or auxiliary. In such a case, the propeller simply buzzes around, kicks up a lot of froth and the boat will hardly be moving. The chances are that the prop will be cavitating and causing great loss of power. If you put on a larger wheel to stop this, the engine may not have sufficient power to turn it. Somewhere, in between, we may hit something that will be slightly more efficient, but the chances are against this as the engine is wrong to begin with. If we put in a larger, heavier and slower turning engine of even much less rated horsepower, we will probably get far greater efficiency and probably greater speed.

Fighting Fire With Fire

[Continued from page 66]

paths of the half-tracks and bulldozers, so that firebreaks sufficiently wide can be scraped.

If the need develops, additional men and equipment will be flown in from other parts of the forest—even from other forests hundreds of miles away.

Weapons to stamp out fire, and so permit and encourage young growth on our timberlands, are needed badly—but they will be available at the close of the war. V-day for a world at war will be D-day for the forest firefighters of America.

Planes Are Getting Personal

[Continued from page 49]

(did you know we had that many independent and important airlines?), ranging from the flat negative to the optimistic positive. The majority consensus holds that planes of this type are truly a boon to all kinds of amateur flying, but probably unnecessary, at least in the predictable future, for transports. Typical of the negative opinions is that of D. C. Richardson, Vice President in charge of operations, American Export airlines, who says:

"In the case of the two-control system, the simplification of flight control so desirable for the inexperienced pilot is achieved with a loss of maneuvering control and other desirable characteristics which make this system unattractive for commercial operations."

Bruce E. Braun, Vice President, Operations for Chicago and Southern Air Lines takes the affirmative side, as follows:

"Certainly, if the manufacturers of passenger airline equipment could design a positive spin-proof airline airplane, it would be a great relief to line pilots."

On the fence is Jack Frye, President of Transcontinental & Western Air, Inc., who writes:

"Our studies on this subject of simplified control have not advanced sufficiently for us to evaluate fully the possibilities of the two-control system in air transport operation."

Despite the fact that these samplings of professional expert opinions vary, they all indicate that the airlines are interested enough in simplified, spinproof engineering to investigate it—a fact significant to the personal pilot because it means that plane manufacturers will be on their toes with new improvements for commercial carriers and these will be reflected in your lightplane of tomorrow.

Even though simplified control has overcome most of the operational difficulties standing between the lightplane and the general public, there are still a number of "bugs" to be taken care of before John Q. and his wife lay their dough on the line F.O.B. Fly Away From Factory.

One big headache is the self starter problem. How can you sell an airplane to a housewife if she has to risk an arm or leg spinning the prop to start the engine? A weight problem exists with regard to two-way radio equipment. Of course, the plane itself could be made bigger, but then you need more horsepower than 65 or 75 and operating costs, gas consumption, etc., zoom. So does initial price. Other improvements are less difficult and are on the way fast. Swivel wheels for crosswind landings, foot brake and throttle like those in a car to be used in taxiing, better visibility, sun shades in low wing planes, bigger luggage compartments—these are a few of the things you can expect the plane salesman to point out when he gives you a demonstration ride.

Don't look for push-button flying, though. It won't arrive for a long time, if ever.

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When dry, your walls are coated with a long wearing coating that is hard to scratch and is noted for its long wearing properties, beauty and lasting finish.

PLAST-X is used on both interiors and exteriors—beautifies your Bathroom, Kitchen, Floors or Basement.

Has excellent insulating value when used for covering Clapboard, Shingles, Stucco, Brick or Concrete exteriors.

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PLAST-X may be added to any color oil based paint, enamel or varnish.

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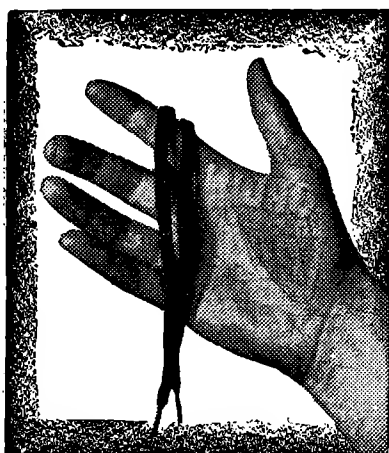
- ☐ 1 bottle of PLAST-X for only 98¢ (enough for one gal. of paint)
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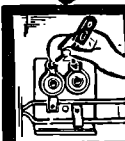
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Wood

[Continued from page 93]

Ground has been broken at Eugene, Oregon, for the construction of a plant which will manufacture industrial alcohol out of sawdust. At Bellingham, Washington, plans are underway for the construction of a similar plant which will manufacture alcohol from the waste sulfite liquors of paper mills in the Puget Sound area.

The United States made wood sugar during World War I by a process developed in the Forest Products Laboratory at Madison, Wisconsin. The problem is one of converting cellulose, first into ducose sugar, and then, by usual methods of fermentation, into alcohol. The process was one of hydrolysis, with dilute sulfuric acid as an activating agent.

This "American process" used a rotary digester. Sawdust and the acid solution were revolved under pressure and heat. The desired reaction took place, but it didn't stop. The sugar decomposed to a considerable extent while it was formed.

At the same time, Germany developed a similar method, but neither could meet the competition.

Under the alcohol from wood process, alcohol can now be produced to sell for less than 25 cents a gallon. Such low alcohol costs might fairly be considered revolutionary.

Most of Europe suffers even during peace time from a permanent deficiency of meats and fats. In war the shortage becomes acute through lack of imported cattle fodder. After the mass slaughter of livestock in Denmark when the Germans took over that country, wood was called to the rescue.

Various acids when applied to wood have the effect of separating the lignin from the cellulose and transforming the cellulose into wood sugar. The process is called hydrolysis. Wood sugar in its natural form is the kind of glucose which makes corn syrup, and is implicitly capable of transformation into any other carbohydrate pattern, from starch to solid or liquid food.

Much of this hydrolytic wood sugar is not refined into sugar granules, but left as molasses which is either used as a food syrup, or fermented and distilled into grain alcohol. Some German Schnapps, and much of Sweden's famous Aquavit started life as wood.

Not only does raw sugar molasses and protein yeast manufactured from sawdust enrich straw and other low-grade animal fodders, but it has been found that overcooked wood cellulose forms a white powder almost equal in nutritive value to oats.

Answers to PLANE QUIZ p. 105: (1) Messerschmitt Me-323, (2) Junkers Ju-87 *Stuka*, (3) Messerschmitt Me-109, (4) Focke-Wulf FW-190, (5) Junkers Ju-88, (6) Messerschmitt Me-210, (7) Messerschmitt Me-110, (8) Heinkel He-111.

He Puts Up A Battle

[Continued from page 58]

altered the pattern slightly. He registered the patents in his own name, and then turned around and sold them to leading oil companies. Within five years, his patents alone brought him well over three-quarters of a million dollars. From then on he operated as consultant to a number of oil companies who paid him handsome retainers for his services.

Today, at fifty-six, the Captain stands just five feet tall. Besides being one of the shortest men in the Navy he is also one of the most dynamic. He seldom walks when he can run, and he is generally conceded to have one of the fastest thinking minds in all Washington. He has to think fast, to put up a better battle than the Axis.

Robot Pathfinder

[Continued from page 38]

by means of a sextant, compass, air speed indicator correction charts, navigational tables, timepieces, etc., etc.—a tough job under the best conditions, a nerve-wracking one when a plane is in combat.

The purpose of the API is to calculate by mechanical means the air position of a plane in terms of latitude and longitude. What makes it remarkable is that it computes from physical data, originally obtained from measurement of air speed and compass direction, an "air plot," as it is called in navigation, already translated and indicated in terms of latitude and longitude.

Since the need for such an instrument was greatest in the case of airplanes, its size was of crucial importance. It had to be compact, light in weight, unaffected by great changes in temperature and altitude, or by violent action of the plane in combat. The computer itself, an electro-mechanical "mechanism that thinks," is only about the size of a quart milk bottle.

At the start of a flight, the latitude and longitude of the point of departure are set manually on the air-position indicator. After this, at any time during flight that the pilot wishes to know his air position he has merely to read the two indicating counters. The air position can be quickly converted to ground position by applying a wind vector line representing the direction and distance that the air has moved since the last position figure were set into the API.

Children, says a psychiatrist, are not able to distinguish fragrances of different flowers until they are several years old.

Aquatic animals have valve-like flaps in the nose, which close for protection when the animal enters the water.

An "itchibell" is a standard of measurement for glass fiber and means a filament 3/10,000th inch or more in diameter.

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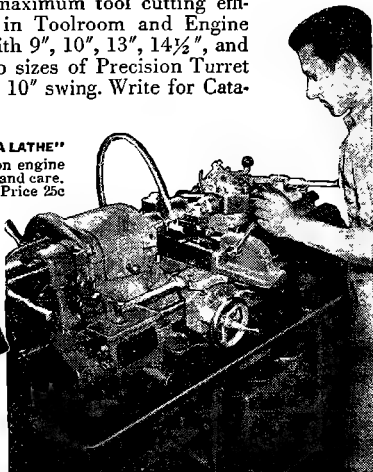
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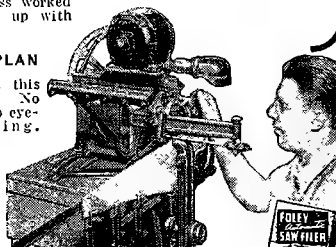
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Ideas For Service Men

[Continued from page 119]

attractive mount for a small bedroom or living room clock. Materials used are two .50 cal. shell casings and a piece of Plexiglas about ¾ inch thick and approximately 6x6 inches square. First step is to remove explosive charge and replace heads of shells. Slots are then sawn in the casings to hold corners of Plexiglas; they should be cut at a slight angle toward rear of cartridges so clock face will slant back a little.

For A Spot Of Tea

A soldier in the Canadian Army serving in Italy sends us a description of a clever tea maker which also heats water for shaving. Spr. Joe E. Downey, Royal Canadian Engineers, writes:

"As you know, the Englishman is great for his tea, and at first we used to make it in any old tin can, but now we have a real outfit. I believe the 'Kiwis,' or New Zealand lads are really the originators of this little gadget, in which we've boiled as many as 7 pints of water in less than 5 minutes. An old margarine tin is used as the 'kettle'—the bottom is cut out and a metal cone soldered in its place. The small end of the cone should stick up about 2 inches above the top of the can. If needed, a small skirt can be soldered to the bottom and an air vent cut in it. Fuel is placed in the small tin under the bottom of the cone and water between cone and outer tin.

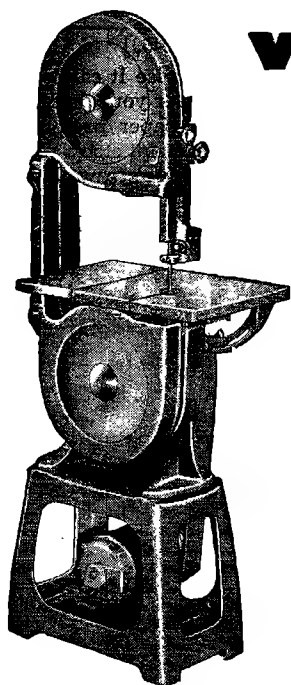
(Due to an error, the text accompanying the following picture was omitted from IDEAS FOR SERVICE MEN in April MI.)



Clothes Line To End Clothes Lines

Pvt. Frank G. Bennett of Eugene, Oregon, writes us about a clothespin-less clothes line he claims will solve any G.I.'s laundry problems, providing he keeps his neck at a respectful distance while operating said line.

"If you take ordinary clothes line," says Frank, "double it, twist it tightly, you will discover that you have a clothes line from which you can hang the old G.I. washing without resorting to the aid of the lowly clothespin. Merely insert the socks, underwear, etc., in the twists of the rope and let them dangle.



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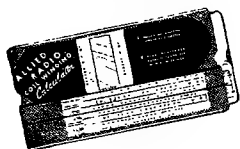
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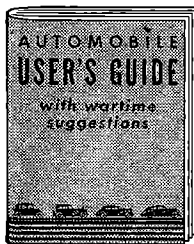
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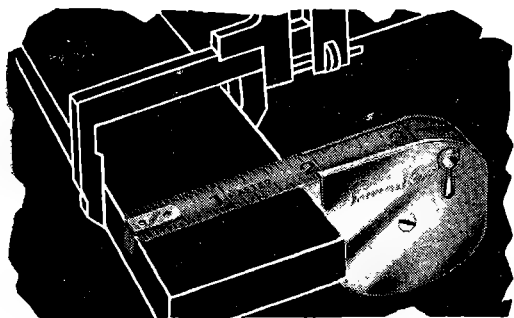
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Costume Jewelry

[Continued from page 69]

parts as it has undercuts, otherwise it cannot be successfully cast in sand. Transfer your design to a piece of metal with carbon paper preferably sheet white metal or other thin metal stock. Then saw out the design with a jeweler's saw. Model with files and engraving tools.

Next prepare the mold for casting. The flask which is used for preparing a mold consists of two cast iron frames which fit together snugly except for one opening through which the molten metal is poured. Molder's supply dealers carry flasks of various types. Pack slightly moist French sand tightly into each frame, right up to the top, then place your model on the sand and close the flask. Open it, remove the model which is now clearly impressed on the sand, and carefully, without damaging the impression, scrape some "gates" into the sand of one frame, from the edge of the model to the edge of the frame. These gates permit the molten metal to flow into the impressed pattern or patterns. Put the model back in place, close flask, then open it again and scrape gates in the sand of the other frame where the impressions show. The gates in both frames should now match. *This is very important.* Remove the model, dust all impressions with baby talc.

Melt the metal in a graphite crucible. When all molten, pour into flask through opening.

Let the mold cool off, then open the flask and remove the casting.

With silver, hold it into a flame with a pair of tongs until it gets red hot, then drop it into a sulphuric acid bath. The latter should be prepared about 8 hours in advance and consists of 1 part sulphuric acid to 3 parts water. After about 15 minutes, rinse the casting off in cold water to remove the acid. If you work with one of the soft metal alloys, DON'T use sulphuric acid; just wash.

Next, saw off the gates, file off the rough burr and any other irregularities.

The piece is now polished. Put some wet powdered pumice on a felt buffer which you attach to your grinder or lathe and thoroughly buff casting. Then wash with soap and water.

Soldering is the next step. The various pieces of the design (if you have made it in several parts) are soldered together. Use hard solder (brazing) for hard metals, like silver, brass, copper, gold, platinum. For soft metals use soft solder.

Silver pieces are again dipped into the sulphuric acid bath after soldering, and rinsed off under cold water. White metal pieces are dipped into cold water, which hardens the metal, then washed off with soap and water.

Final polishing is done with jewelers rouge on a clean felt buff which must not be contaminated by any of the coarser compounds. For finish, have pieces plated, lacquered or left natural. Set stones with rubber cement.

Silver is used in recoil mechanisms of all anti-aircraft guns and field artillery pieces.

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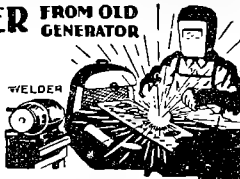


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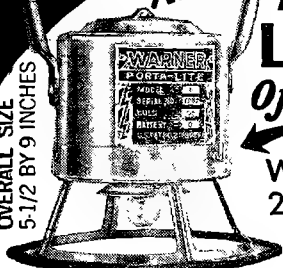
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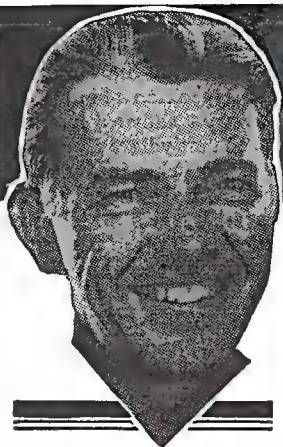
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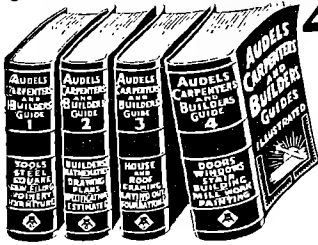
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Refueling On The Run

[Continued from page 51]

drop back toward the stern of the carrier—the fueling boat taking up a position about 150 feet away, the second boat (not shown) moving off to a distance of about 250 feet where it acts solely as an anchor to keep the mooring line taut. Dangling from the mooring line are a number of small buoys to support the fuel hoses which stretch under water from the carrier to the fueling boat. From the stern of the fueling boat is then released a securing-trailing line attached to a buoy.

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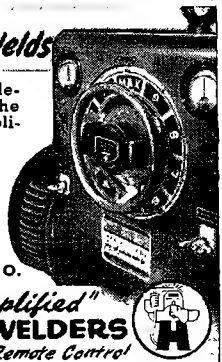
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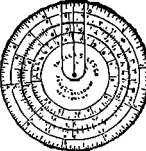
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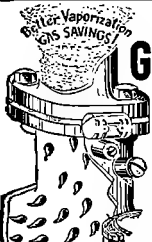
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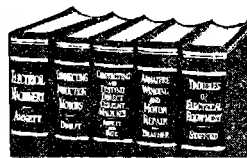
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[Continued from page 82]

at the hub), and all the right hand tender wheels are insulated at the hub. The drawbar between the locomotive and the tender is made of fiber. The current is picked up by the left hand tender wheels, goes to the motor, and is grounded through the right hand locomotive wheels.

All car wheels are insulated.

There are two groups of model railroaders: Those who claim that true modelling of existing prototypes is the right method, and those who believe in free-lancing; i.e., incorporating in their motive power and rolling stock the most attractive features of various existing roads. Both views have their justification, but since few free-lance locomotives and cars are available, the disciples of this form of railroading must depend upon their own skill and the tools at their disposal.

Building a locomotive from a commercial kit presents no serious difficulties. In most cases the machining has been done at the factory, and that reduces the work to cleaning the castings and assembling the parts according to given instructions and blueprints.

Building a free-lance locomotive is a different proposition, and the final result depends entirely upon the skill and the patience of the builder. A workshop with power tools is almost a necessity because a great number of parts must be machined from stock.

Navy Unishops

[Continued from page 45]

one dragged into his backyard. But right now they are being dragged only onto invasion beach-heads, where, with lathes spinning and acetylene torches flashing, they put damaged water buffaloes and other small craft back into action before the enemy has time to recover from the first shock of attack. In addition, they can supply food for their operators until chow facilities get ashore.

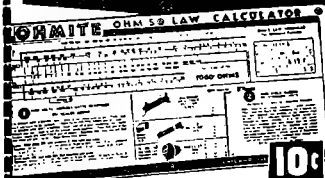
The Navy officially calls its handy-and-y invention the E9A Unitized Repair Base. Each of the base's seven units handles a specific task. One has tools for repairing hulls, another fixes engines and transmissions. There is one that supplies spare parts, puts out fires, furnishes divers with air, pumps water and generates electricity.

One unit is loaded with radio equipment and has loudspeakers and a cook stove built into its sides. Another unit, known as a retriever, has a crane and a winch and is kept permanently aboard an LVT which is detailed to scoot in and out among partly-sunken craft.

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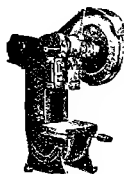
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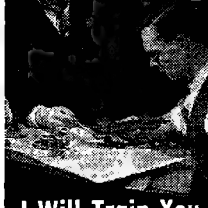
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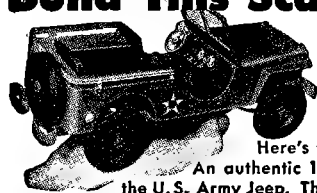


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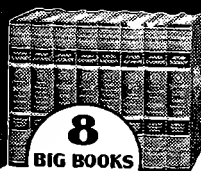
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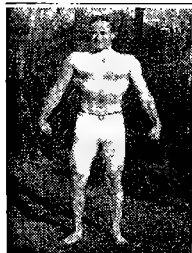
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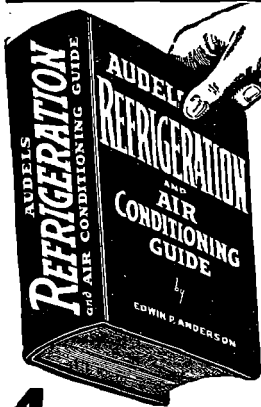
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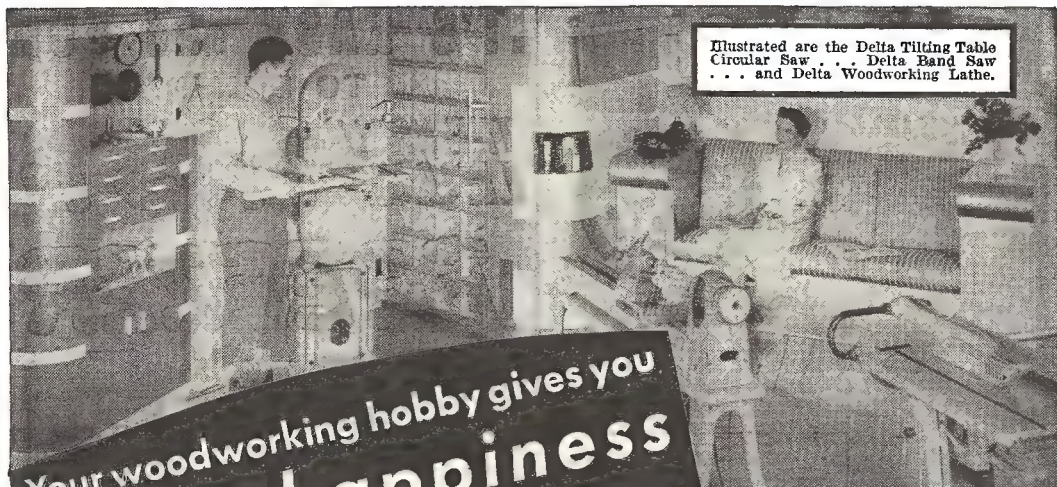
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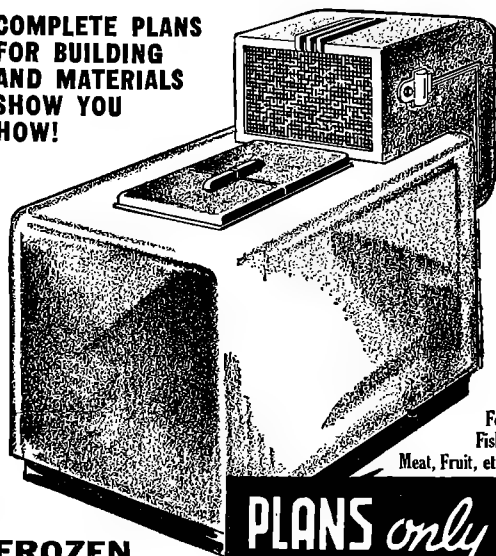
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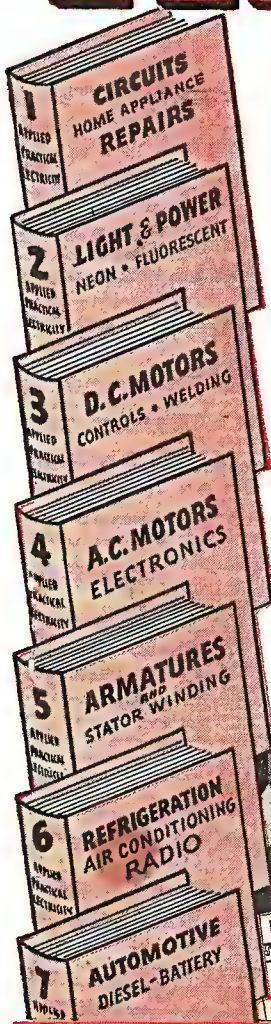
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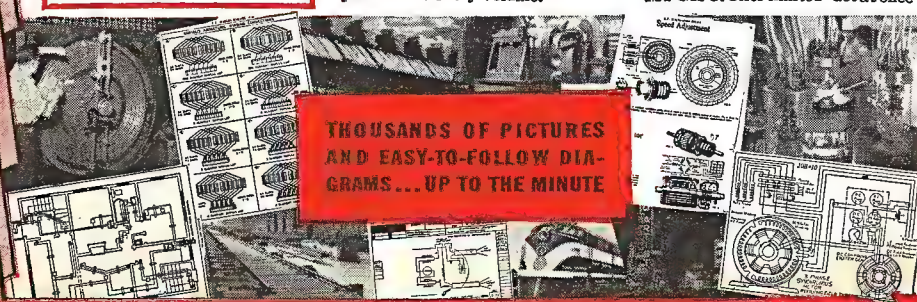


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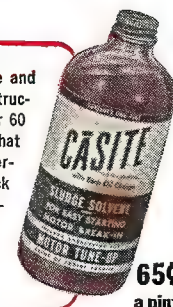
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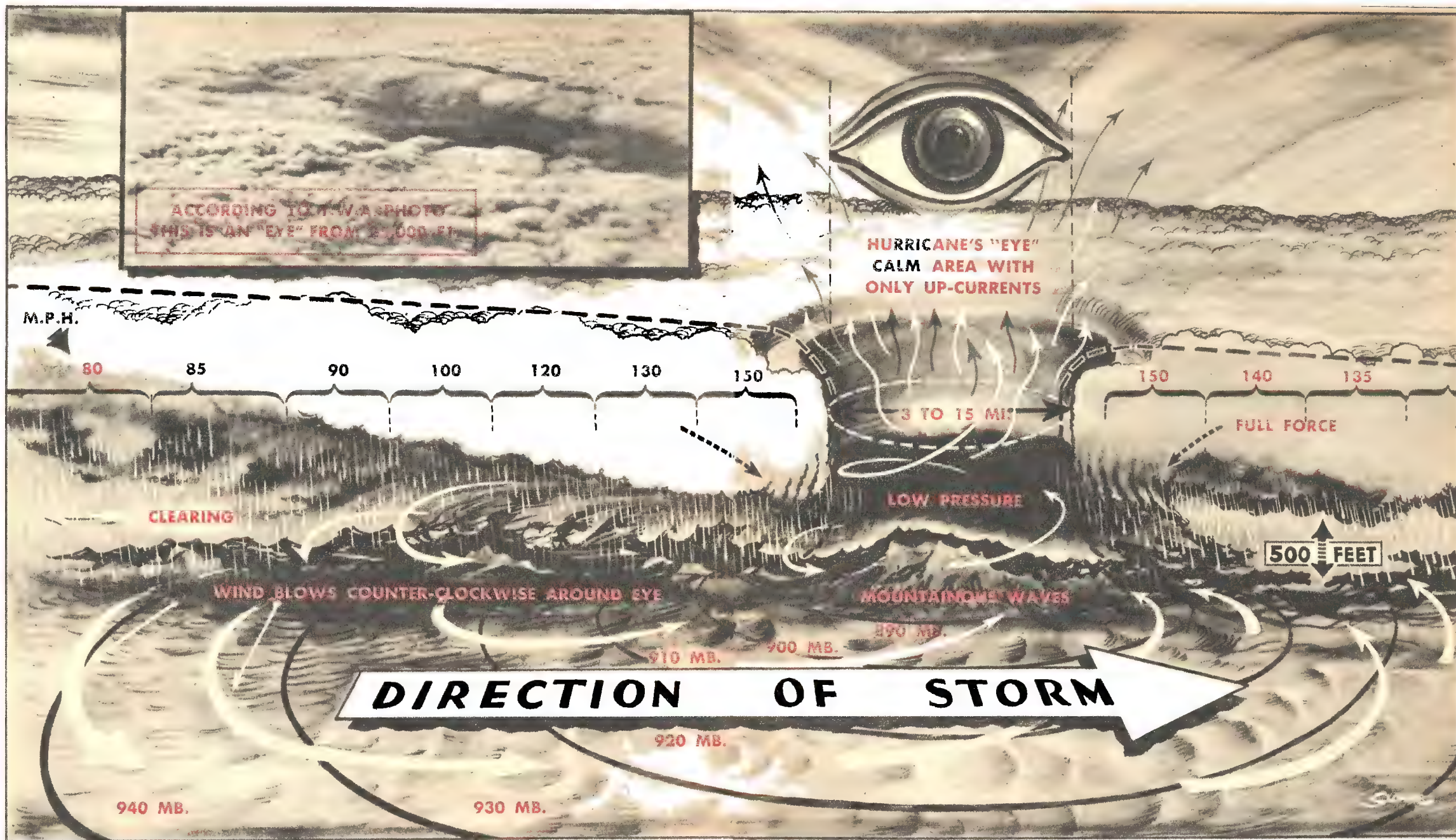
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LOOKING A HURRICANE IN THE "EYE"

by Eric Sloane

Men who flew in last September's hurricane discovered that at the heart of the storm, air currents rise, not fall.

WEATHER is probably the most illogical of the sciences. At high altitudes you will both roast and freeze at the same time; you go toward the sun only to become colder. In general the atmosphere acts like a spoiled brat, always doing the wrong thing. Little wonder then, that there are scores of doubters

for each new discovery in meteorology, the science of the weather.

Take for instance, the mystery of the hurricane's "eye." During our recent Atlantic coast hurricane, scores of brave pilots flew near the storm and some flew straight through it in the cause of scientific research.

Photo at top left shows the "eye" of the hurricane as seen from 25,000 feet, far above the storm. Drawing shows airmen's new theory of what happens at the heart of the storm when it is at its height.

Their great discovery was that the famed "eye" really exists at high altitudes (over 6,000 feet), and that the currents within it were upward instead of its supposed "sink-hole" downdrafts. But were the scientists elated? Not at all. They insisted that the photos of the eye such as the one shown at

by John Maguire

Comes V-Day, a vast array of destructive tools, from flamethrowers to dive bombers, will be hurled into the blitz against forest fires.

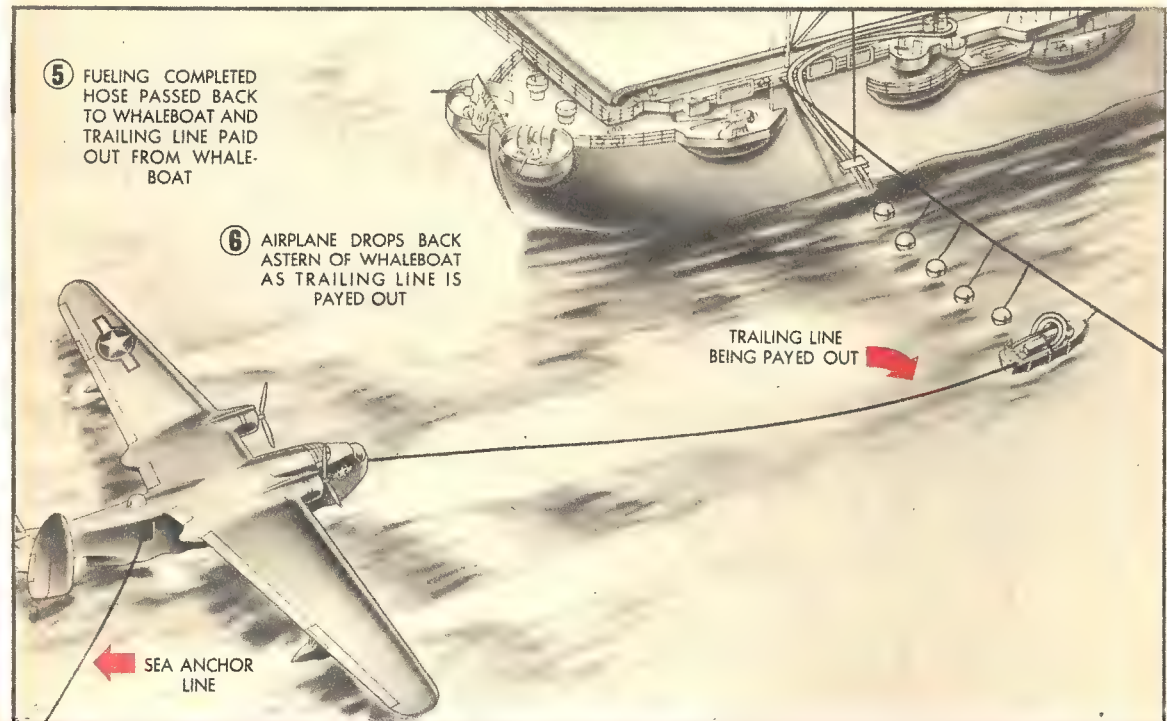
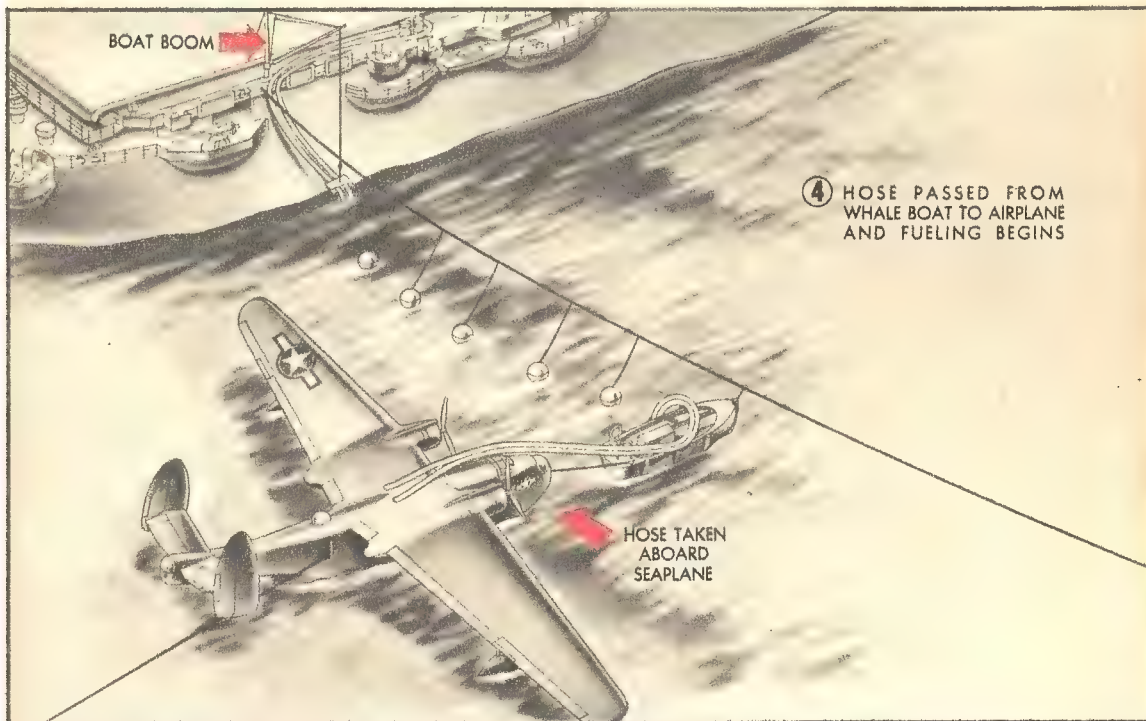
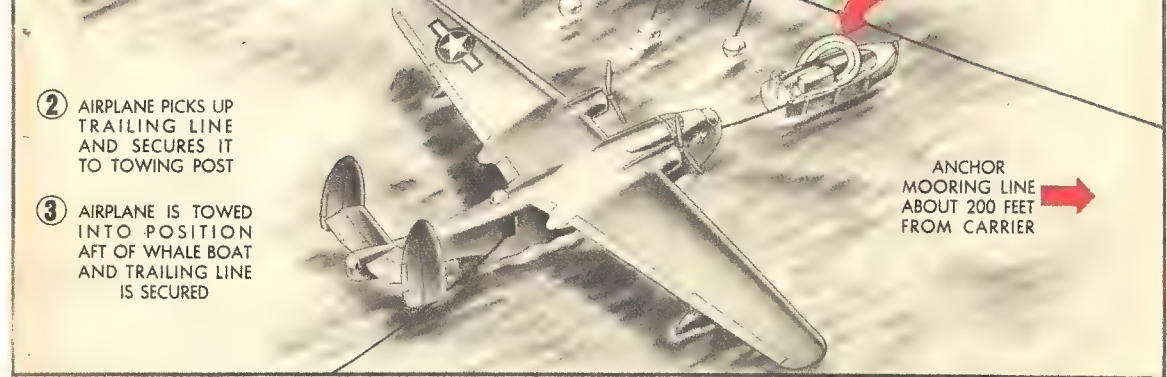
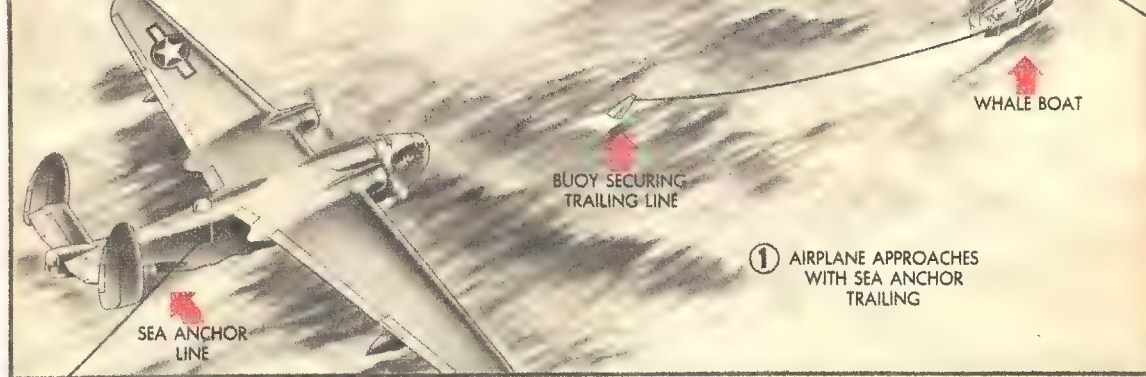
THE vast stock of tools of destruction built up by the United States in the past few years will not all be tossed into the discard when peace comes. A tremendous, never-ending peacetime war—the nationwide fight against forest fires—will make immediate inroads on our war-weapon stockpiles.

Sparked by the researches of David P. Godwin of the United States Forest Service, men of the forest industries have been dreaming of V-day since

This drawing visualizes a postwar forest fire, with all the deadly machines of war combatting it. Flamethrowers start back fires, bulldozers dig trenches for firebreaks, a helicopter sprays chemicals, personnel is rushed to the scene by jeep, half-track, transport plane. Overhead medium bombers drop sticks of flame-quenching bombs; crews are directed by walkie-talkie.

FIGHTING FIRE WITH FIRE





REFUELING ON THE RUN

U. S. CARRIERS and tankers are now serving as mid-ocean "filling stations," handling the tricky business of issuing gasoline to other craft while cruising at submarine-dodging speeds in enemy waters. This refueling technique greatly extends the operating range of the flying

boats and small surface ships which the Navy is using to patrol vast fighting areas in the Pacific. In the four drawings above are shown the main operations in refueling one of the Navy's biggest flying boats—a Martin Mariner.

Informed by radio that the Mariner

would like to drop down for a drink, the carrier, without reducing its speed, puts out two whale boats to which has been attached a heavy mooring line. To one of the boats are also attached two fuel hoses. Pulling away on the leeward side, the whale boats [Continued on page 150]

FLYING

THE ATSC has just released information on six experimental planes which have been abandoned for use against the Axis. Left is the XP-75 which was planned to use P-40's wings, P-51's fuselage, F4U's landing gear, A-24's tail. Has 3,000 HP Allison engine.

THE McDonnell XP-67, a single seat interceptor built for a battery of fixed cannon, is a test of the flying wing principle. It has a nacelle design which permits a certain amount of forward thrust from a jet of exhaust gases. The long range fighter carries 6 .37mm. cannon.

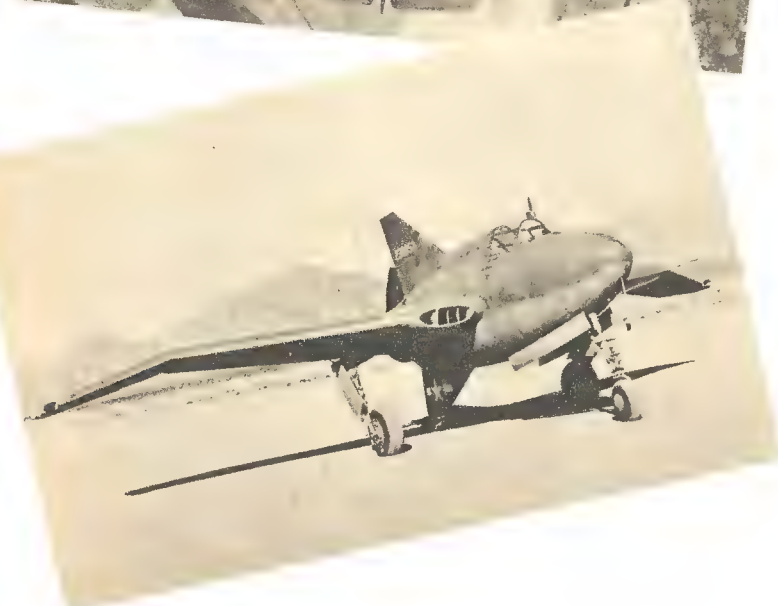
LATERAL controls and elevator are at the wing tips of the Northrop XP-56, another flying wing design. The 3-bladed counter-rotating pusher-type props mounted on a single shaft are driven by a radial engine, weight of which is concentrated amidships.

FREAKS

THE 3-blade prop on this pusher-type Curtiss XP-55 can be jettisoned by the pilot if he has to jump. Vertical stabilizers on the wing tips replace the conventional rudder. Elevator controls are in the nose. Guns in nose need not be synchronized with prop blades.

THERE'S an elevator to get in and out of the cockpit on this Vultee XP-54. The bottom is hinged and lowers the pilot seat electrically. Twin-boomed, with a flush-riveted skin and a wing with extremely low drag, plane has an in-line Lycoming engine.

BABY of the lot is the XP-77, only American all-wood plane developed in this war. Bell-built, it was projected when metal shortage loomed as critical, has a hollow prop shaft to permit use of single cannon. It has greater maneuverability than Jap Zero.

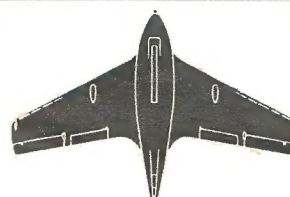
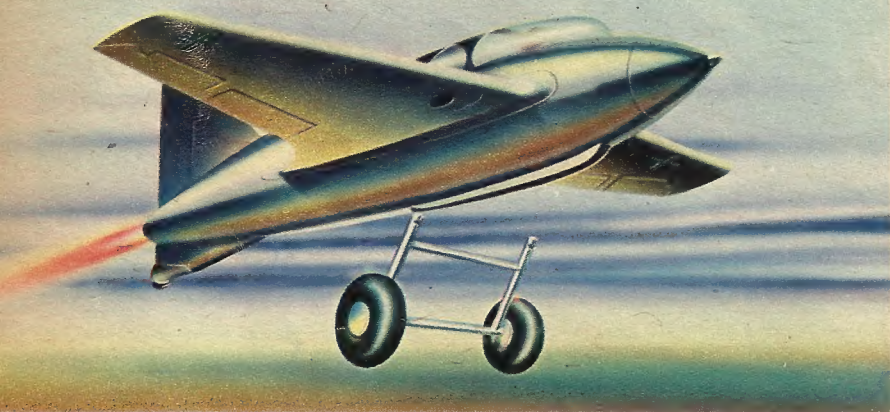


GERMAN JETS

by Gilbert Paust

M. I. Aviation Editor

Nazi jet-propelled fighters have been flying since 1942. Our pilots have learned to respect the Me-262, He-280 and rocket fighter Me-163



Me-163 is world's first rocket fighter. Some models, with warhead in nose, are used for ramming; pilot-ejector device, operated by push button, catapults pilot to safety. Wheels drop after take-off; plane lands on skid.

HIGH in the air over the German Reich a formation of Fortresses is carrying its cargo of explosives to dump upon a vital Allied objective. Still higher above them hovers their protecting escort of fighters.

Suddenly, there appears a streak of flame below them.

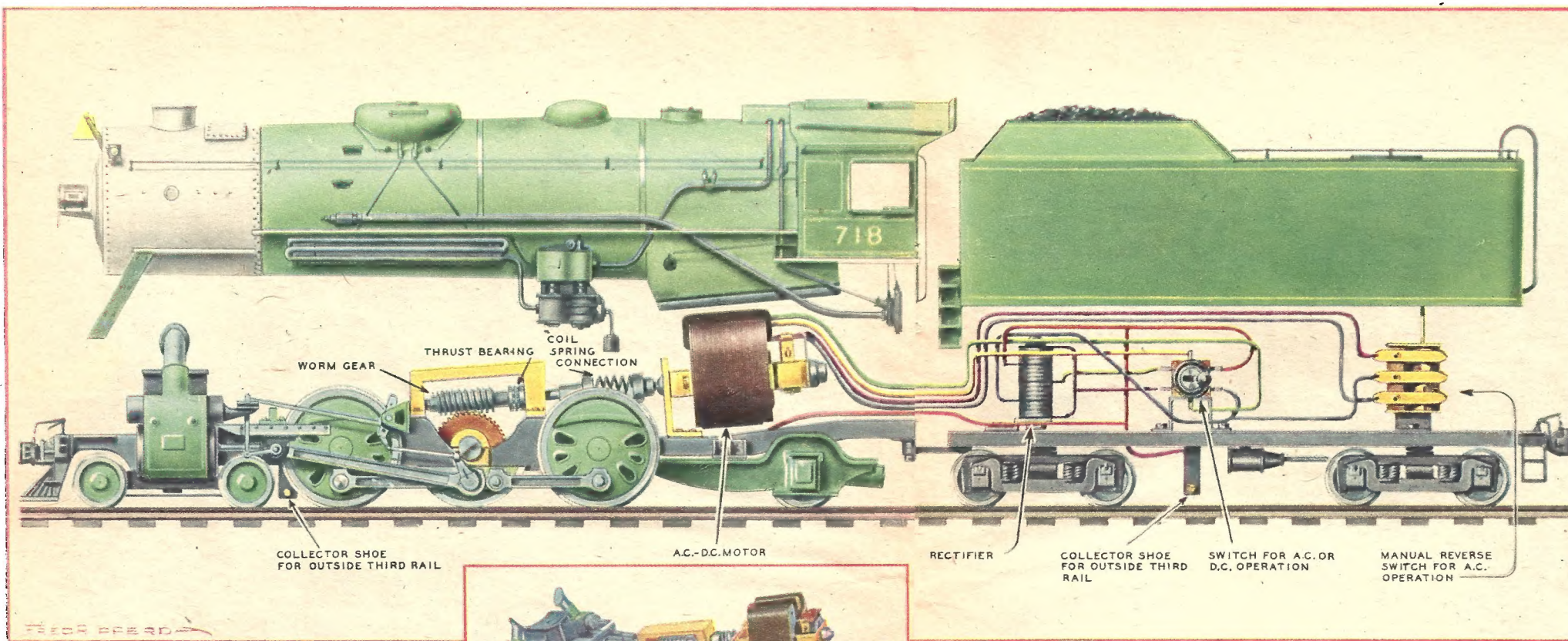
It increases in size as it approaches the heavy bombers, and then it flashes through the formation, leaving a thin line of exhaust gases in its wake.

It turns, and heads toward the lead Fortress.

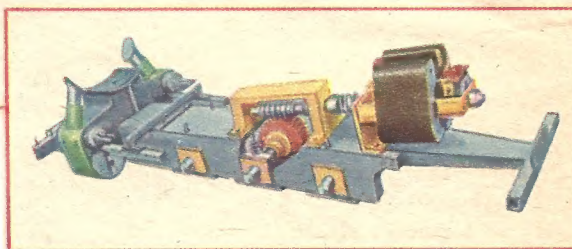
Above, the fighters dive to defend their charges from this new, mysterious menace. The turrets of the Fortress turn toward it and the sky is momentarily lined with the thin trails of tracer shells as it comes within range of the "50s."

Never swerving, it speeds straight for the large plane. There is a heavy explosion as it strikes, and the Fortress, a flaming mass of wreckage, disappears from view.

Drawings adapted from FLIGHT



Exploded drawing of the construction of a typical O-gauge locomotive shows: wiring for both AC and DC operation; spring connection between motor and gears, which assures a smooth start; use made of locomotive tender. Models are usually built from kits.

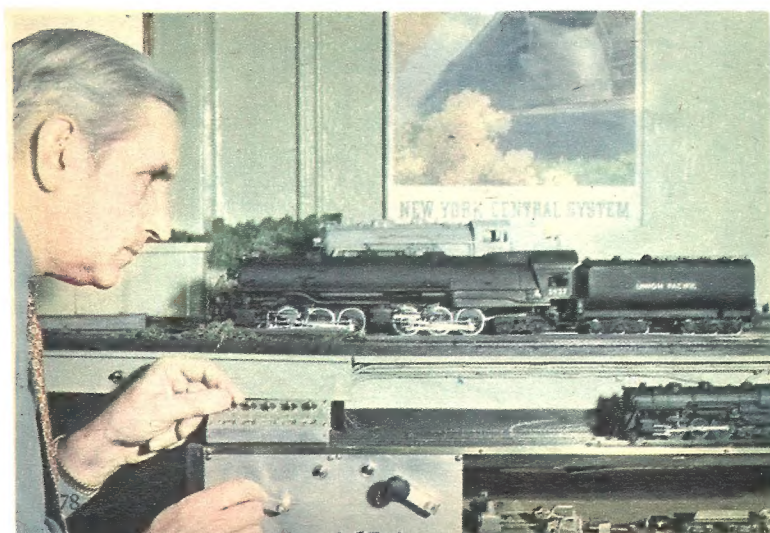


correct rods, and valve motion. Solid rails laid on stained wood ties replaced the ready-made tinplate track. The high price of these exclusive models accounts for the still prevailing belief that model railroading is an

expensive hobby. It certainly was in those days! During a short stay in England in 1933, the writer had the opportunity to see a 1¼" gauge layout that, although still in the stage of construction, had cost approximately \$8,000. Each locomotive was custom built according to the owner's own specifications and cost about \$375.

The development of model railroading during the past twenty years has been amazing. Not only are there model railroaders practically all over the world, but the manufacturing of models and equipment has grown

An O-gauge Mallet articulated locomotive being tested.



to the point where it may truly be called an industry. Until the war halted production, a number of well established American firms was putting out a great variety of fine locomotives and cars, ready to run or in kit form. True-to-scale steel rails could be bought at comparatively low cost, and finished intricate trackwork was available to the less skilled railroaders.

Other manufacturers specialized in scenic structures of all kinds and artificial earth, grass, trees and shrubs. A wide range of fine electric equipment was put on the market, and books and hundreds of

articles were written on operation and landscaping.

The creation of The National Model Railroad Association was the first important milestone to be reached. This miniature American Railroad Association, with its several thousand members, established rules and standards to which model railroaders as well as all manufacturers adhere.

Yet such remarks as, "Call it what you like, it's nothing but playing with electric trains," can still be heard. This leads to the question: What is Model Railroading?

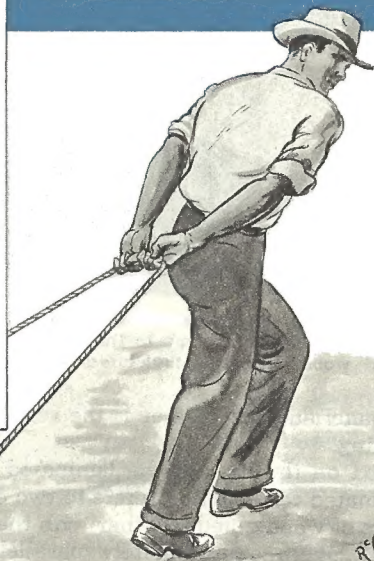
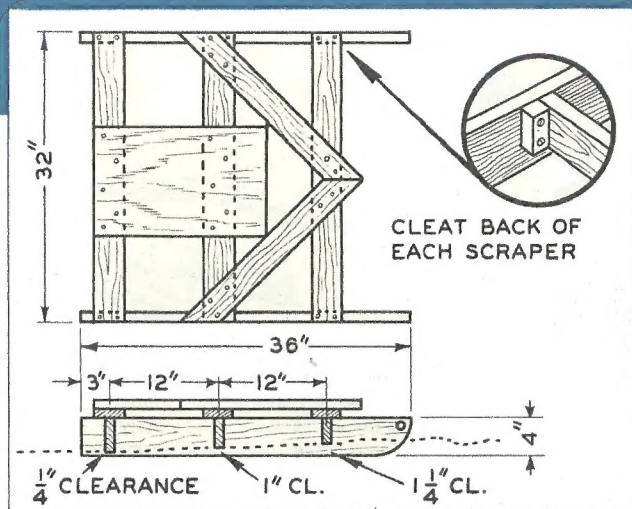
Some years ago the writer had the occasion to define the hobby as follows:

Model railroading is creative work. No matter how small the layout, how modest the conditions under which it is built, it is a section of the world in a nutshell. It is a miniature myth-

Fred Ripperda, MI staff artist, operates one of two lathes in his fully equipped apartment workshop, which measures only 6'x9'.

GARDEN

IDEAS

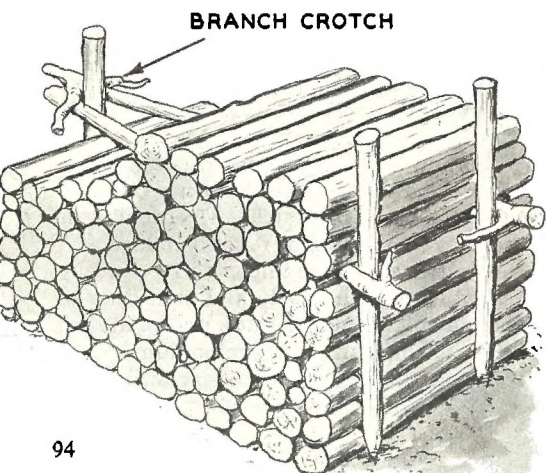


THIS GRADING SLED can easily be built from a small amount of scrap lumber. The three scrapers are of progressively less clearance, starting at 1 1/4" at the front, and graduating to only 1/4" at the rear. With this arrangement an exceptionally smooth garden plot grading job can be done. A sand bag or stone is carried on the platform as ballast.

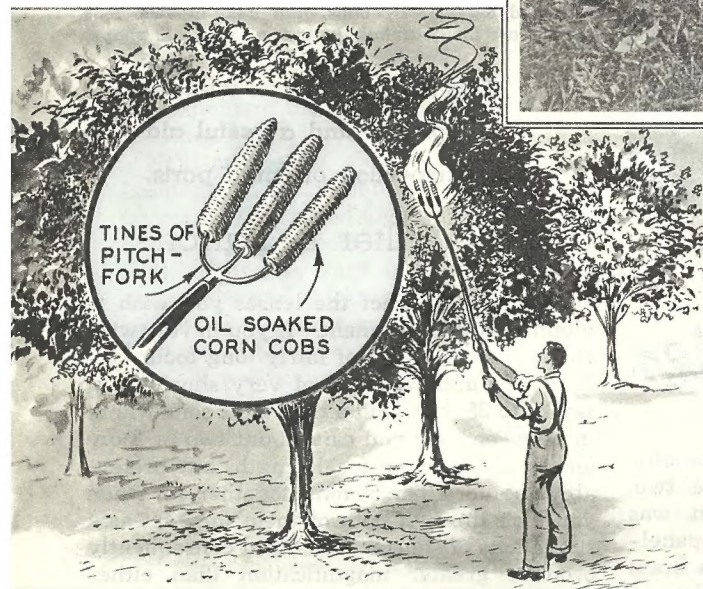
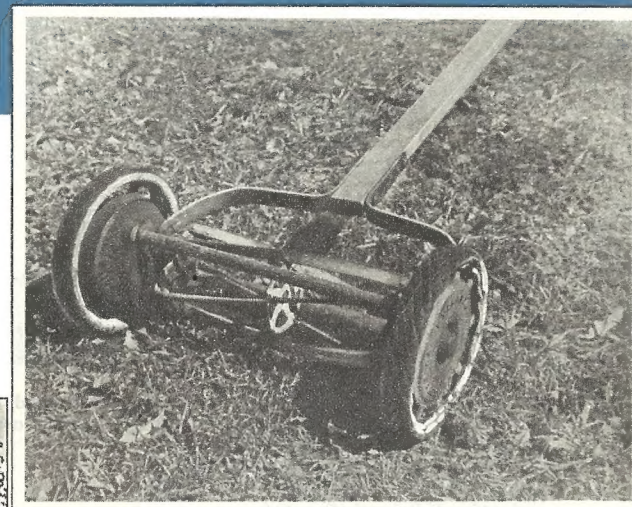


MEDICINE DROPPERS make the even distribution of small seeds an easy matter. Remove the rubber top of the medicine dropper, fill the glass portion with the seeds, replace bulb, and squeeze it to dispense seeds.

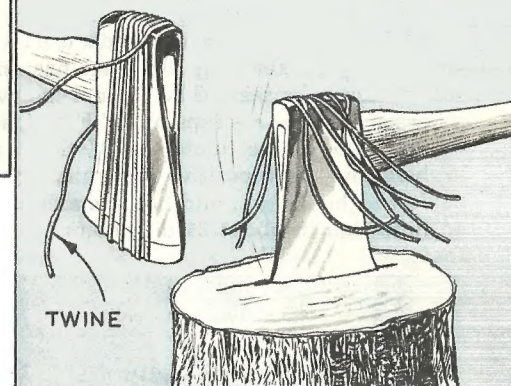
STACK CORDWOOD to conform to cord measurements, by using crotched saplings or branches, cut to the proper length and used as shown. This method of stacking produces a wood pile that remains in shape as logs are removed. It is an easy matter to judge the amount of fire wood on hand when you use this system, and logs can't roll off.



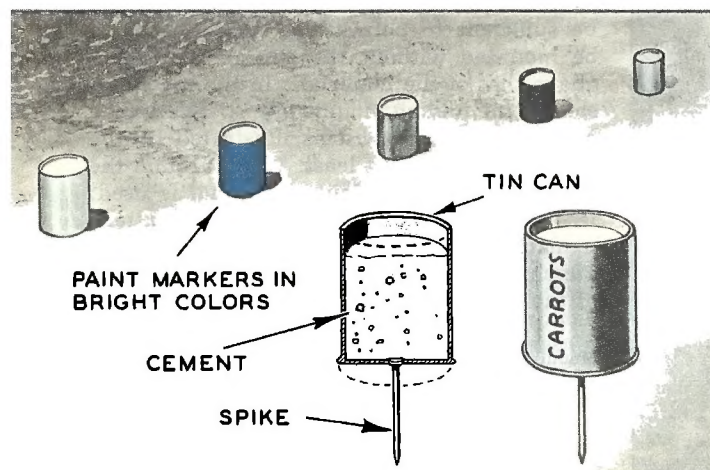
MAKE TIRES for your old metal-wheeled lawn mower, from old bike tires. Cut the tires to the proper length to go around the lawn mower wheel, and sew the ends together with wire through the tire walls. The wire should be carried through the spokes.



OIL SOAKED CORN COBS impaled on the tines of an old pitchfork, and ignited, serve as effective torches for destroying tree moths and caterpillars. It is easy to reach the branches, and the corn cob wicks cost practically nothing. Don't use a new fork.



MAKE SACK TIES OF EQUAL LENGTH by wrapping twine around an axe as shown, and driving the axe blade into a block of wood to cut the twine. The ties that are cut in this manner are all the same length, and are not as likely to fray as when cut with a knife. Tie twine ends to the axe before cutting.



PATH MARKERS of an inexpensive but durable type can be made from tin cans filled with cement. A 6" spike is driven down through the bottom of the can. The head of the spike should be left a little above the can bottom so that the cement will hold it firmly when hard. The outside of the cans may be painted in bright colors or plain white. For row markers in garden, stencil vegetable names on.



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